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SUMMARY OF RECENT ABSTRACTS*

VII. HELMINTHIASIS †

(Continued from p. 883)

General

Ascaris, *Trichuris* and *Enterobius* are still commonly found in surveys in Europe, together with various cestodes (BRANCACCIO and VINGIANA, p. 57; LO NIGRO *et al.* (Italy), p. 487; LUPAŞCU *et al.* (Rumania), p. 1276), and similar infections are found in Iran, where *Trichostrongylus orientalis* also is common in people keeping donkeys and goats (BIOCCA, p. 253; BIOCCA and PAGGI, p. 263), and in Indonesia, where hookworm is also common (LIE KIAN JOE and TAN KOK SIANG, p. 44).

ZDZIENICKI (p. 497) and ZDZIENICKI and NOWOSIELSKI (p. 926) found eggs of intestinal parasites—largely *Ascaris*, *Trichuris* and *Enterobius*—on 41% of carrots and 53% of beets in Poland, and on 47% of lettuces and 93% of radishes in Warsaw; human faeces are used as fertilizer.

SOH (p. 730) examined the effect of ordinary food preservatives (salt, sugar, vinegar, garlic, mustard, spices, etc.) on eggs and larvae of *Ascaris* and *Ancylostoma duodenale*. They were in general more effective against *Ancylostoma* than against *Ascaris*, and the author concludes that if mustard or garlic is used in pickling, and vinegar is omitted, foods preserved in pickling mixtures for several weeks will contain no infective larvae of *Ancylostoma*, and few of *Ascaris*.

The techniques used for estimating the numbers of helminth eggs in faeces all show considerable variation even with the same specimens, but BIAGI and GONZALEZ (p. 45) have found that Ferreira's centrifugal flotation method gave the least number of failures to detect eggs; it is probably necessary to examine 3 specimens before an estimate of the number of worms can satisfactorily be made.

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1960, v. 57. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

† For previous articles on helminthiasis in this series, see the August and September issues of the *Tropical Diseases Bulletin* each year since 1939.

Anthelmintics for intestinal infections

Several authors have written reports on the value of dithiazanine in intestinal helminthiasis; the general impression seems to be that it is very valuable in *Ascaris*, *Trichuris* and *Strongyloides* infections, and perhaps in *Hymenolepis* and *Taenia* infections, but not in hookworm infection (El Bitash and Saif, p. 264; Aguilar, p. 142; Glass, pp. 379, 1277; Villarejos and Saldaña, p. 499; Albornoz-Plata, p. 717; Guerrero *et al.*, p. 718; Vinke and Van der Sar, p. 819). Particular mention of its action in *Strongyloides* infection is made by Basnuevo *et al.* (p. 827), Adamson (p. 925) and Pereira Lima *et al.* (p. 1289), but Basnuevo *et al.* (p. 835) report only moderate success in *Trichuris* infection. Vomiting may occur but this can be reduced if the tablets are coated (Biagi *et al.*, p. 915).

Bephenium hydroxynaphthoate (Alcopar) receives very favourable notice for hookworm, *Ascaris* and *Trichostrongylus* infections; it was given as a single dose (Nagaty and Rifaat, p. 496; Ahmad and Rasool, p. 496; Ghysels and Sartiaux, p. 924; Ninane and Poffe, p. 924; Juminer and Zakine, p. 1085; Sagnet and Demé, p. 1191; Hahn *et al.*, p. 1277).

Hayashi *et al.* (p. 730) report moderately successful results with 4-iodothymol in Japanese children with hookworm infection. Komiya *et al.* (p. 1192) found it about as effective as 1-bromo naphthol.

Molina Pasquel and Díaz Muñoz (p. 728) mixed a minute quantity of the emulsifying agent Tween 80 with tetrachlorethylene, and report that this greatly increased its efficacy in *Necator* infection. González Barranco and Mazzotti (p. 729), however, found that Eumulgin 05 was a better emulsifying agent than Tween 80, and that the drug can be given to children in this way. It was not very effective against *Enterobius*.

Favourable accounts of piperazine salts in *Ascaris* infections are given by Schiappacasse *et al.* (p. 1290), and Biagi and Rodriguez (p. 1192) who used the hexahydrate repeatedly to eradicate the infection from a closed community in Mexico. In a comparative trial on patients in a Bombay hospital Vora and Vasi (p. 498) found a single dose of piperazine citrate or adipate more effective than the tartrate or the phosphate, in the treatment of *Ascaris* infection, but in general the results were disappointing. Dosage varied from 1 gm. of base (in a syrupy emulsion) for children aged up to 6 years, to 3 gm. for those over 12 years. Bueding *et al.* (p. 498) by a labelling technique have been able to show that piperazine blocks the myoneural junction of *Ascaris*, which leads to diminished muscular activity and diminished production of succinate from lactate.

Domoic acid is a new anthelmintic, extracted from a seaweed, and Asami *et al.* (p. 1291) report some success with it against *Ascaris* infection.

Sheffield *et al.* (p. 743) report on the effects of various anthelmintics on *Nematospiroides dubius* in mice, which is used as a test parasite.

Hookworm: Strongyloides

A proportion of hookworm eggs exposed to temperatures between + 5° and − 5°C. for up to 30 hours remain viable, *Ancylostoma duodenale* eggs being more resistant than *Necator americanus* eggs (Kobayashi *et al.*, p. 151).

Matsumoto (p. 826) devised a medium containing amino acids for the cultivation of hookworms, and observed that when the medium, after cultivation of dog hookworms, was inoculated into rabbits they became anaemic.

Control medium without the worms did not have this effect. The anaemia-producing factor released into the medium was heat-stable, and was soluble in ether, alcohol and acetone.

HURLY (p. 56) has devised a method of estimating hookworm loads which depends on the total number of eggs excreted daily and is obtained by multiplying the egg count by the weight of the daily stools. The technique is described in the original paper, and the method is regarded by Gordon as more satisfactory than others.

GONZÁLEZ *et al.* (p. 825) remark that hookworm infection is present in almost 90% of people in rural areas of Paraguay, and report on various clinical syndromes resulting from this infection; most of the patients studied had light infections. Certain Malay military recruits with hookworm infection were found by FIELD *et al.* (p. 65) to have low haemoglobin levels; after a few weeks of good diet the level rose satisfactorily—no other treatment had been given. LAYRISSE *et al.* (p. 495) found serum vitamin B12 levels of 50–300 $\mu\mu$gm. per ml. in Venezuelan subjects heavily infected with hookworms; absorption was normal. Tests with folic acid indicated defective absorption, and this could not be attributed wholly to a deficient diet accompanying heavy infection.

The incidence of hookworm infection is gradually decreasing in Egypt, as a result of mass treatment during the past 30 years and the more recent construction of large numbers of latrines; ABDALLAH (p. 391) comments that the incidence in one village where a cheap kind of footwear made from old rubber tyres was commonly used was much lower than in a neighbouring village where this was not the practice.

PANCALDO (p. 151) shows that ferrous gluconate is quite suitable for oral administration in hookworm anaemia.

BLANK *et al.* (p. 57) examined 183 compounds against filariform larvae of *Ancylostoma braziliense*, and mention several which could be effective in the treatment of human infections.

FERRIOLLI (p. 152) has devised a modification of the Baermann technique for the diagnosis of strongyloidiasis; details are given. HUCHTON and HORN (p. 152) from Tennessee report 16 cases of this infection (3 fatal).

Ascaris, etc., Larva migrans

Adult *Ascaris* live in almost anaerobic conditions in the gut, but VORA (p. 154) found that when these worms taken from patients or at autopsy were exposed to mixtures of oxygen and nitrogen, mortality was increased only at concentrations of 40% oxygen or more.

SOULSBY and COOMBS (p. 500) show that human anti-A and anti-B, and pig anti-A agglutinins were neutralized by *Ascaris* materials.

HACIG and SOLOMON (p. 613) prepared various antigens from *Ascaris* and *T. saginata*, and demonstrated immune bodies in rabbits after injection of these antigens. Allergic tests with these antigens in children with (and some without) helminthic infections were positive, and cross reactions were produced in precipitation and complement-fixation tests.

SORESCO and PANAITESCO (p. 614) show that when unsheathed living *Ascaris* larvae were incubated at 37°C. with serum from an animal infected with *Ascaris*, microprecipitates occurred at the extremities. Specific antibodies

appeared in the sera of guineapigs on the 5th day after ingestion of large numbers of embryonated eggs.

MUAZZAM *et al.* (p. 1085) describe a case in which adult *Ascaris* were found in the bile ducts and liver, and eggs in the liver tissue, of a patient who had died with a hepatic abscess.

Reduction in serum proteins was observed by GERBASIO and VINGIANI (p. 926) in children infected with *Ascaris*; this is attributed to loss of appetite and interference with absorption of food, resulting from the infection. PATZ (p. 153) reports an outbreak of acute eosinophilic pneumonia, possibly due to massive infection with *Ascaris*, in a group of Africans who had attended an illicit beer party.

In a paper on the surgical complications of *Ascaris* infection VALCARCEL and RAMOS-OLLER (p. 614) report 31 children, all with signs of acute intestinal obstruction. Most responded to intravenous fluids, parenteral antibiotics and Wangensteen suction, but in 9 operation was performed; the appendix was blocked with worms and perforated in 5. Radiological diagnosis is important.

Various authors have investigated the killing properties of chemicals on *Ascaris eggs*; some details are given in the original abstracts (DOZANSKA and IWANCZUK, p. 154; KUNII, p. 154; FUJITA, pp. 155, 1193; WYSOCKI and NASILOWSKA, p. 500; IWANCZUK and DOZANSKA, p. 615; ENIGK and ECKERT, p. 1291).

CHOWDHURY *et al.* (p. 1292) inoculated eggs of *Ascaris suis* into the eyes of experimental animals and observed the host reactions, which they describe.

CHAUDHURI and SAHA (p. 58) gave embryonated eggs of *Toxocara canis* intragastrically to guineapigs and to a human volunteer, and observed a great increase in blood eosinophils which persisted for many weeks. There were also signs which suggested pulmonary involvement, and the experiments support the idea that tropical eosinophilia is due to infection with larval nematodes for which man is not the normal host. Visceral larva migrans due to larvae of *Toxocara canis* can be a serious disease, particularly in children, and diagnosis is difficult since the larvae seldom reach adult form, and examination of stools for eggs is therefore useless; KAGAN *et al.* (p. 265) experimented with various ascarid and toxocarid antigens for haemagglutination and flocculation tests, but though these were active there was no specificity. VAN THIEL (p. 928) reports a child with encephalitis, in whom a nematode larva was found in the brain; it was probably a larva of *Toxocara* from a dog or cat, and the condition was visceral larva migrans. In a trial of the haemagglutination test with antigens from *Toxocara canis* and *Ascaris* JUNG and PACHECO (p. 1194) found positive results with sera from persons with visceral larva migrans, but there were cross reactions with sera from persons infected with *Strongyloides*.

PETTER (p. 1293) reviews the subject of larva migrans, noting that man may become infected by accidental ingestion of ascarids of wild animals; *Lagochilascaris minor*, a parasite of wild felines, has been recovered several times from man.

FRIEDMAN and HERVADA (p. 501) describe (for the first time) a child with visceral larva migrans who developed severe myocardial involvement, but recovered.

HITCH and IRALU (p. 924), in a study related to creeping eruption, report on drugs which are able to kill *A. caninum* larvae. They note that the larvae

are not killed by freezing—and success of the time-honoured freezing treatment must therefore be due to blistering and exfoliation. Heat which can be borne by the patient will not kill the larvae.

An immature female *Dirofilaria conjunctivae* has been recovered by LENTH (p. 1293) from a chest lesion of a woman in the United States; in comment Kershaw suggests that it might have been *D. immitis* in an abnormal host. JUNG and HARRIS (p. 933) report from Louisiana a case of human infection with a species of *Dirofilaria*; the lesion was a subcutaneous nodule.

Gnathostoma infection

YAMAGUCHI (p. 51) investigated species of *Gnathostoma* in Shikoku, Japan; *G. spinigerum* is common in man in the eastern part of the island. SHIRAKAWA (p. 269) has been able to prove that the fox *Vulpes vulpes japonica* can serve as a complete final host of *G. spinigerum*, and BABERO *et al.* (p. 396) have found gnathostomes in raccoons, opossums and other animals in Georgia, U.S.A.; the species could not be distinguished satisfactorily from *G. spinigerum*. FURUNO (p. 160) remarks that the intradermal reaction is accepted as the most reliable means of diagnosis of gnathostomiasis, but reports experiments on a precipitin reaction which might be useful.

UOZUMI (p. 52) experimented with X-rays as a treatment for *G. spinigerum* infection of fish and rats, but could not advise its use in man.

Filariasis: General

At the Nairobi conference on helminthiases (p. 604) GORDON discussed the reaction of vertebrates to arthropod bites in relation to filariasis and other diseases, STANDEN discussed chemotherapy and JORDAN the control of *W. bancrofti* infection by periodical administration of diethylcarbamazine to all inhabitants of an infected area (with 90% reduction in the microfilaria rate), WOODMAN discussed *Loa* and its vectors in West Africa and the Sudan, BARNLEY and PRENTICE *Simulium neavei* and its relation to *Potomon granviki* in Uganda, GROUNDS the treatment of onchocerciasis with suramin, BUCKLEY the relationship between pulmonary eosinophilia and infection with filarial worms of animal origin, and HOLMES the general effects of helminths on man.

NELSON (p. 267) notes that on Pate Island off the coast of Kenya, where *W. bancrofti* infection is common, 7 species of filarial worms exist in the local animals, and larvae found in mosquitoes may lead to error if they are assumed to be of human origin. He shows that many larvae in wild mosquitoes can be identified, and indicates the points of differentiation, giving a key. Similarly, infective larvae found in *Simulium neavei* in Uganda are not all of human origin.

NARAYANDAS (p. 268) describes techniques for the staining of microfilariae of various species; fixation in a 3:1 mixture of absolute alcohol and normal HCl gave the best results.

HUSSON and SCHNEIDER (p. 928) used alcoholic extracts of 4 filarial worms (*Dracunculus medinensis, Dirofilaria immitis, Litomosoides carinii* and *Dipetalonema vite*) as antigens for complement-fixation tests in proved or suspected filariasis (*W. bancrofti, L. loa, D. perstans*), but the results were inconsistent and the authors conclude that the test is not specific and cannot be compared with identification of adult or microfilarial worms, or even with the intradermal reaction. TANABE (p. 733) reports on skin tests with antigens

prepared from larvae of *W. bancrofti*, and with an antigen, probably from dead parasites, which occurs in the urine of infected patients after treatment with diethylcarbamazine.

STALLYBRASS (p. 62) concentrates blood microfilariae by mixing 5 ml. of venous blood with an anti-coagulant, pipetting off the supernatant plasma, centrifuging it and staining the deposit.

Wuchereria bancrofti infection: periodic

JORDAN (p. 1195) in Tanganyika found that the *W. bancrofti* microfilaria rate tended to increase with age to about 66 years, and the higher the mean rate the higher the mean microfilarial density per positive blood, and the higher the incidence of genital filariasis. In general, persons with genital filariasis have low microfilaraemia rates whereas in Pacific areas, where the parasite is non-periodic, persons with genital filariasis tend to have high microfilaraemia rates; this may reflect differences in the pathogenesis of elephantiasis. Similarly ORAM (p. 1086) found *W. bancrofti* in Africans on the north shore of Lake Nyasa, the incidence increasing with age to a maximum of 44% in males aged 21–30.

GALLIARD (p. 618) discusses *W. bancrofti* var. *vauceli*, a parasite found in Madagascar, whose microfilaria is half-way between that of *W. bancrofti* and *B. malayi*; the adult has not yet been found.

NAIR (p. 930) sums up the incidence of filariasis in India, and the organization created to deal with it.

Observations by BHATIA and WATTAL (p. 617) indicate that in certain parts of India a *Culex fatigans* density represented by 34 captures per 10 man-hours is the level below which transmission of *W. bancrofti* does not take place. In Trivandrum, India, there has been an increase in the incidence of *W. bancrofti* infection as a result of the introduction of a water supply without adequate associated drainage, and MENON and PILLAI (p. 735) comment on the need for collaboration with health authorities in any engineering projects which affect the flow of water. A survey by RAHMAN *et al.* (p. 616) indicated *W. bancrofti* infection in 13·39% (rising to 26·37% at age 50 or more) in a town in Uttar Pradesh, India, where the infection was apparently unknown 60 years ago. *C. fatigans* showed an infection rate of 0·9%. A similar survey elsewhere in the state (including villages) showed an infection rate of 10% (RAHMAN *et al.*, p. 617).

BASU (p. 441) found *W. bancrofti* in 10·9% of persons examined in South Andaman, and in 4% in the Nicobar Islands.

In parts of Djakarta *W. bancrofti* (periodic form) infection is fairly common; CHOW *et al.* (p. 393) found that 0·3% of a large number of *C. fatigans* contained infective larvae. They discuss the biology of this species, noting that it showed high resistance to DDT and dieldrin. In a survey of a village in Netherlands New Guinea DE ROOK (p. 731) found *W. bancrofti* infection in the night blood of 20·9% of the people. The vectors were *C. annulirostris*, *Anopheles farauti* and *C. fatigans* (regarded as of minor importance). VAN DIJK (p. 501) reports that *Anopheles koliensis* is apparently an important vector in inland New Guinea.

WU (p. 395) reports an extensive survey of soldiers and civilians in Taiwan, in whom the incidence of filariasis was found to be 1·34% and 6·63% respectively. *W. bancrofti* was the common parasite, but *Brugia malayi* was

also found in the soldiers. Those among the indigenous inhabitants of Taiwan who were positive had resided in the Pescadores islands.

In one part of Kwangtung the filariasis rate was found by CHU *et al.* (p. 156) to be 28%, and much lower rates were found in other places; the only species discovered was *W. bancrofti*, and *C. fatigans* was the vector.

UTTLEY (p. 829) gives an account of the mortality and epidemiology of filariasis in Antigua during the last 100 years. *W. bancrofti* (vector *C. fatigans*) and *Mansonella ozzardi* are the filariae present in the West Indies.

In Porto Alegre, Brazil, RACHOU *et al.* (p. 59) found the infection in 0·14% of persons examined, and in 6 of 12,490 *C. fatigans*. This is said to be the most southern focus of *W. bancrofti* infection in the world. DOBBIN *et al.* (p. 59) report infection with *W. bancrofti* at the low rate of 1% in the island of Fernando Noronha, Brazil; 15% of *C. fatigans* examined were infected.

WILLEMSE (p. 501) infected *C. fatigans* (from New Guinea) and *Aedes polynesiensis* (from Samoa) with the periodic form of *W. bancrofti* (from Surinam) and found full development to infective forms in *C. fatigans*. The *Aedes* all died before infective forms could appear, but the author thinks that full development may be possible.

ERA (p. 829) after experiments on the alteration of sleeping habits of a man infected with periodic *W. bancrofti*, and of dogs infected with *Dirofilaria immitis*, concludes (as has long been known) that the nocturnal periodicity of these microfilariae is due to the habits of the host, but in comment Hawking states that the problem is how the microfilariae become aware of the general habits of the host—not just the activity or sleepiness at any particular moment. FUKAMACHI (p. 1196), from similar experiments, concludes that stress may provoke the migration of microfilariae to the peripheral circulation, and prolonged treatment with chlorpromazine can cause a significant change in periodicity.

Treatment: control

Diethylcarbamazine has been used for carriers of *W. bancrofti*, as a single-dose treatment, by HSIEH *et al.* (p. 833) in China, or as a course of repeated doses for 5 days and at intervals thereafter by SASA *et al.* (pp. 507, 735, 736) in Japan, or in courses lasting 7 days by RACHOU and FERREIRA (p. 395) in Brazil. Immediate results are said to be fairly satisfactory, especially in light infections, but the treatment needs to be repeated. FRIEDHEIM and DE JONGH (p. 830) have observed that Mel W (the water-soluble form of Mel B) appears to be able to kill adult *W. bancrofti* when administered intramuscularly in a course lasting 3–4 days. In comment Hawking states that other trivalent arsenicals are known to kill the adult worms but may be toxic; a short course such as this may be an advantage in this respect.

JORDAN (p. 502) reviews various methods which have been tried in the treatment of elephantiasis; the general conclusion is that though some benefit may be obtained from the techniques employed, the results are only partly successful. He (p. 734) reports disappointing results with prednisolone. PIETERS and LE MAIRE (p. 831) describe an operation for elephantiasis of the penis which they call the " cravat procedure ".

IYENGAR *et al.* (p. 735) found evidence to suggest that a malaria control programme of residual spraying with dieldrin was effective in reducing transmission of *W. bancrofti* by members of the *Anopheles punctulatus* group in Netherlands New Guinea.

IYENGAR (pp. 392, 393) has published reviews—consisting of a large number of abstracts—relating to the epidemiology and clinical features of filariasis in the South Pacific area.

In a survey carried out in the Central and South Pacific BYRD and ST. AMANT (p. 392) found filariasis (*W. bancrofti*) in 8·3 to 19·9% of various groups of people. In Polynesians the infection rose to a maximum of 41·3% at 50 years. *Aedes pseudoscutellaris* was the vector in American Samoa but *Anopheles farauti* was the vector in the New Hebrides. For Tutuila island, American Samoa, IYENGAR (p. 732) quotes an infection rate of 15·9% with non-periodic *W. bancrofti*; the vector is *Aedes polynesiensis* with filarial infection rates of up to 4·6%. It breeds in coconut shells and small collections of water, and in tree holes. He makes recommendations for control of breeding round the villages. MCCARTHY (p. 828 *bis*) reports that filariasis is hyperendemic in certain of the Cook islands, and moderately endemic in others. He makes the point that high rates seem to be related to activities which take the person to the habitat of the vector—chiefly *Aedes polynesiensis* in the bush and in coconut plantations. Men who work and boys who play in these mosquito habitats therefore tend to show higher rates than women and girls whose activities are more restricted.

In an investigation in Fiji SYMES (p. 60) found that *Aedes fijiensis*, *Aedes pseudoscutellaris* and *Aedes polynesiensis* were about equally effective as vectors of non-periodic *W. bancrofti*; *C. fatigans* was not. He showed that *Aedes pseudoscutellaris* could be infected by subjects with low (or even negative) microfilarial counts. *Aedes pseudoscutellaris* and *Aedes polynesiensis* are predominantly bush dwellers, the former found near the coast and also inland, and the latter in the coastal belt. The dog filaria *Dirofilaria immitis*, and the fruit-bat filaria *Pleuropus hawaiiensis*, could develop in several species of mosquitos [and this might lead to confusion]. Various methods of control of the infection were tried experimentally.

In Tahiti where the incidence of non-periodic *W. bancrofti* infection was formerly high, a campaign comprising mass treatment with diethylcarbamazine and control of mosquito breeding within 100 metres of each dwelling, instituted about 1954, has apparently been very successful; MARCH *et al.* (p. 1086) now report that the microfilaraemia rate has fallen from 6·9% to 2·2% for all males, and there has been comparable reduction in clinical manifestations.

Brugia malayi infections: B. pahangi

BUCKLEY (p. 832) gives the reasons why he has erected a new genus—*Brugia*—to include the species *malayi*, *pahangi*, and *patei* which were formerly considered to be species of *Wuchereria*.

EDESON (p. 618) records observations which indicate that variations between observers occur in the diagnosis of *B. malayi* infection in Penang, and that considerable variations in microfilarial counts occur from day to day in the same infected person. Higher infection rates were found when 60 cmm. than when 20 cmm. of blood were examined. Much other information on the accuracy of blood surveys is given in this paper, which should be read in full.

RAGHAVAN *et al.* (p. 265) report a survey of nocturnal blood in Kerala State, India, in which they found infection with *B. malayi* only, which rose to a maximum at the age of 30 years; the general infection rate was 25·9%. *Mansonia uniformis* was identified as the vector, and its egg clusters were found

under grass blades in seepage channels; *Pistia stratiotes* was not found. NAIR *et al.* (p. 832) in reporting on a filarial survey of part of Kerala State where the vector was *M. annulifera*, comment that incidence has apparently not changed much in the last 25 years.

In the Kota area of Kedah HASSAN (p. 505) found *B. malayi* in up to 35·9% of the population; the vectors were *Mansonia uniformis* and *M. annulifera*. Mass treatment was given to all the population with diethylcarbamazine in single doses (5 mgm. per kgm.) weekly for 6 weeks, and the final results were encouraging. In East Pahang, Malaya, LAING *et al.* (p. 1087) report that *B. malayi* has occurred naturally in dusky leaf-monkeys, palm-civets, long-tailed macaques, wild cats, and pangolins, moon rats and giant squirrels. The incidence of *B. malayi* in leaf-monkeys was very high (76%) and these animals appear to form a reservoir which will impede attempts to control the human disease. *B. pahangi* is also capable of infecting man [see EDESON *et al.*, below], and is therefore a threat, but *B. malayi* is the dominant human parasite.

FRAGA DE AZEVEDO *et al.* (p. 59) note that *B. malayi* was probably the only filarial worm found in a survey of diurnal blood in Timor, though they do not completely dismiss the possibility of non-periodic *W. bancrofti* also.

In part of the Hupeh Province of China WU (p. 156) found filarial infection in up to 76% of groups of people on co-operative farms. "All the worms were of the malayi type" and the only vector seemed to be *Anopheles hyrcanus* var. *sinensis*, the transmission season being from June to August.

RAICH and GLEASON (p. 503) report a patient with asthma, eosinophilia of over 50%, and a painless mass in the axilla (later found to contain microfilariae, probably *B. malayi*). He had served in Southern Korea. Treatment with penicillin, bronchodilators, and later prednisone and diethylcarbamazine, brought much relief and a reduction in the eosinophilia. It has hitherto been uncertain whether diethylcarbamazine will kill adult *W. bancrofti* or *B. malayi*; EDESON and LAING (p. 737) now report on experiments with cats infected with *B. malayi* or *B. pahangi* which show that the drug will kill the adult worms, and presumably will also kill *W. bancrofti*.

In Malaya TURNER (p. 157) treated with diethylcarbamazine (in single daily doses of varying amounts) a group of patients infected with *B. malayi*. There was much variation in response and in the development of reactions, but more than half were cleared by a total dose of less than 20 mgm. per kgm., and almost all by 60 mgm. per kgm. Long-term results were disappointing in that microfilariae were found again in 11 of 34 patients, but this may have been due to re-infection in the highly endemic area. Phenergan did not modify the febrile reactions, but may have increased the action of diethylcarbamazine. TURNER and SODHY (p. 504) gave single daily doses of diethylcarbamazine (of up to 12 mgm. per kgm. body weight) to inhabitants of a small Malayan island where infection with *B. malayi* was common. The object was to continue the treatment until the recipients (some with and some without microfilaraemia) had received 100 mgm. per kgm., but few persisted so far. Febrile reactions occurred in all with microfilaraemia and in some without it (who probably had cryptic infection). Side effects were not severe, and a satisfactory clearance rate was demonstrated; but such a schedule of treatment was regarded as impracticable as a large-scale policy.

WHARTON (p. 157) contributes a note on the determination of age in

Mansonioides; details should be sought in the original. BURTON (p. 833) lists a number of water plants to which *Mansonia annulifera* will attach itself in tanks or ponds in South India. NAIR and RAY (p. 619) used a weed killer (Simazin, Geigy) successfully for the destruction of *Pistia stratiotes* in Kerala, where *M. annulifera* breeds in association with it.

EDESON (p. 737) examined the periodicity of *B. malayi* and *B. pahangi* in various animals; both were semi-periodic with a peak usually at night.

In experiments on volunteers EDESON *et al.* (p. 929) have been able to show that *B. pahangi* (hitherto known only as a parasite of animals) can be transmitted to man by the injection of infective larvae from a mosquito host, and must be regarded as potentially infective to man.

Onchocerca infections

In parts of Kenya where *Simulium* is common and active, and onchocerciasis is found in the inhabitants, BORODA (p. 507) failed to find any positive skin snips in over 400 Europeans and Asians employed in a mining community.

From experience in the Congo BROWNE (p. 622) found that skin snips are better than skin puncture in providing microfilariae; the snip should be teased in saline and the deposit after centrifugation should be examined. In one area almost all adults were infected, and half the people without onchocercomata showed microfilariae. The nodules were found especially in the pelvic girdle area, less frequently in the shoulder girdle area, and least on the head. Various onchocercal skin affections are recorded, including depigmentation; eye lesions were found only in hyperendemic villages, and patients with serious eye lesions usually had had the disease a long time and had many nodules; iridocyclitis was observed, and choroidoretinitis and a few cases of optic atrophy. The author mentions lymphadenitis and the "hanging groin". *Simulium neavei* was common and 5% of specimens caught on man were infected. In part of the Congo, near the river, the same author (p. 1293) found onchocerciasis in 31% of men, 21% of women and 3% of children by skin snip. Onchocercal depigmentation, which is only seen in hyperendemic foci, was fairly common in infected persons. 5% of captured *Simulium* harboured larvae of *O. volvulus*. The depigmentation is seen in the pretibial regions, the groins, Scarpa's triangle, over the iliac spines and (in a few) on the chest. The depigmentation is distinct from onchocercal dermatitis though often associated with it. If all detectable onchocercomata are excised the depigmented areas may recover their colour. The depigmentation is probably caused by a toxin from larval or adult worms.

MILLER (p. 621) has found that for diagnosis in light infections with *O. volvulus* in Liberia it is advisable to make a minimum of 4 smears, one from each hip and calf, where the highest microfilaria recovery rates may be expected. He describes a technique of skin incisions from which blood and tissue juices are expressed manually on to a slide.

CROSSKEY (p. 1090) discusses the control of *Simulium* in various parts of the world. He notes that in Mexico and Guatemala onchocerciasis occurs in circumscribed zones 450–1500 metres above sea level, and is associated with coffee growing. In Nigeria the onchocerciasis areas are diffuse. Infection rates in the Old World vectors (5–20%) are much higher than in the New

World vectors (1%), and there are important differences in biological features and biting habits.

In part of the Congo BROWNE (p. 1199) found that the only *Simulium* biting man was *S. neavei,* which was captured in forest clearings up to 1 mile from streams. Females were especially active in the early morning and late afternoon, and most bit below the knees; infection was found in about 5%. Larvae and pupae were found on crabs in streams at higher altitudes, and treatment of the streams with DDT to produce 1 part per 500,000 for 30 minutes on 10 occasions markedly reduced the number of flies; the treatment did not kill crabs but apparently killed some fish.

In wooded country in Southern Cameroons and in Liberia LEWIS (p. 1198) did not observe any difference in biting activity of nulliparous and parous *Simulium damnosum*, though this has been reported from more open country. Thickly wooded country probably restricts movement and reduces contact with man. He found infection with *O. volvulus* in up to 12·7% of flies dissected. He (p. 1200) reports observations on the *S. neavei* complex at Amani, Tanganyika; the unbanded forms were predominant on crabs, but were not seen to bite man; the banded forms bit man readily, and infection (with *O. volvulus* and other species) was found in 12·8%. In an account of the Simuliidae of British Honduras LEWIS and GARNHAM (p. 658) point out that although *S. metallicum*, a known vector of *Onchocerca*, is found there, the disease itself has apparently never been established.

BIAGI *et al.* (p. 62) produce evidence to suggest that *Simulium gonzalezi* may be a vector of *Onchocerca.*

HILL (p. 508) discusses the measurement of water flow in relation to streams in which *Simulium* breeds.

BROWNE (p. 624) describes 2 papillomata associated with intense onchocercal infection of the skin. JOPLING (p. 740) reports 2 cases in which swelling of a limb, without skin rash or dermatitis, was the presenting sign of onchocerciasis. MAZZOTTI (p. 624) reports 5 patients in whom microfilariae of *O. volvulus* were found in the spinal fluid and blood during treatment with diethylcarbamazine.

DE MOURA (p. 63) from Angola reports ocular lesions, and blindness, in patients with strong clinical evidence of ocular involvement due to onchocerciasis. Lesions of the posterior segment were common. D'HAUSSY and UEMURA (p. 1115) argue that the retinal lesions seen in onchocerciasis are probably not of genetic origin as has been suggested by SORSBY, but are closely linked with onchocerciasis—a point of view which is not accepted by Choyce in his review of the paper.

RODGER (p. 268) describes the dissolution of the microfilaria of *Onchocerca volvulus* in the human eye, and the effect of this on the tissues. The complicated details are indicated in the original abstract and the author concludes that this microfilaria is a perfectly adapted parasite, and that the inflammatory changes observed in the cornea are caused by products of dissolution, not by any secreted exotoxin. He (p. 159) treated with one of 5 drugs patients with onchocerciasis; only diethylcarbamazine and suramin killed the microfilariae, and none killed the adults. For the prevention of ocular complications, therefore, he argues that the best therapeutic approach is to reduce the microfilarial population, and this is best done with diethylcarbamazine.

FRIEDHEIM and DE JONGH (p. 1089) treated 2 onchocerciasis patients with

Mel W, one of them receiving TWSb also, 53 days after the course of Mel W. In both the long-term results were good; the full effects of these (short) treatments were not manifested until after 9 months or more.

Loa infection

In drills (*Mandrillus leucophaeus*) infected with human (diurnal) or simian (nocturnal) *Loa loa* DUKE (p. 931) observed microfilariae in the blood, increasing to a peak at 9–12 weeks and then diminishing rapidly to scanty numbers. If the spleen was removed the numbers in the blood rose and remained high. Even when the peripheral blood contained few microfilariae great numbers could be found in the lung capillaries, and the author concludes that there is a persistent reservoir of microfilariae in the lungs but that after 9–12 weeks of infection the spleen destroys most of the circulating microfilariae though the female worms continue to produce them. If the spleen is removed a balance is reached at a higher level, the microfilariae appearing to live for 6–12 months. He (p. 61) reports on the biting habits of *Chrysops* in the Southern Cameroons. *C. silacea* and *C. dimidiata* (Bombe form) differ in their daily and seasonal biting habits, but both bite more intensely in the presence of wood smoke. The overall peak of infective biting for *Loa loa* is from April to June. Details should be sought in the original. The same author (p. 1198) observed that in the presence of a wood fire nulliparous *Chrysops silacea* tends to bite man in the morning, and parous flies in the afternoon; in the absence of a wood fire no obvious difference in the period of activity could be observed; with *C. dimidiata* the biting activity was not biphasic, but parous flies were more frequent in the afternoon, whether a wood fire was present or not. There was no difference in the biting of flies whether infected with *Loa* or not.

CREWE and GORDON (p. 620) show that in persons and monkeys infected with *Loa* there is less reaction to bites from uninfected *Chrysops* than from those infected with *Loa*. It appears that besides the sensitization stimulated by the salivary fluid, additional sensitization develops after previous infection.

CARAYON *et al.* (p. 394) report 4 cases in which *L. loa* or *W. bancrofti* infection appeared to be the cause of neuro-psychiatric symptoms.

Tetracyclines fluoresce in ultra-violet light, and TOBIE and BEYE (p. 1197) found that when administered to animals they tend to be concentrated in newly formed bony tissue, and in filarial worms and microfilariae; they describe the use made of this phenomenon in detecting *Loa* in a human patient and *D. immitis* in dogs.

TAYLOR (p. 1088) attempted culture of various stages of *Loa*, *Litomosoides carinii* and *D. immitis in vitro*; the best medium was fresh rat serum plus solution 199.

Dracunculus infection

SCOTT (p. 834) reports surveys of *Dracunculus* infection in parts of Ashanti where the incidence is as high as 40% in some areas. Climate is the greatest single factor in distribution. In long dry seasons where people must depend on shallow ponds for their water the rate is high, but where running water is available the disease is kept in check. The rates are highest in women and lowest in girls but more than half the population are infected by the age of 10. Variations in individual susceptibility are attributed to differing degrees of gastric acidity—high acidity protects.

COHEN (p. 509) reports the first known radiological demonstration of a male *Dracunculus medinensis* (in the wrist) in West Africa south of the equator.

RICE (p. 160) shows that in an Indian village where guineaworm was prevalent the village worker encouraged the people to strain the water from the step wells, treated the wells with bleaching powder, and prohibited people with emerging worms from entering the wells; the incidence then fell.

Enterobius infection

RICCI (p. 269) emphasizes the importance of schools in the spread of *Enterobius* infection in Italy; within a few months of a fairly successful mass treatment with piperazine the incidence rose to pre-treatment heights.

VAJRASTHIRA and HARINASUTA (p. 1295) report that they found *Enterobius* infection very common in Bangkok children, rising to a peak of 60% at age 7–8 and falling thereafter. This infection is common in Japan, and HAYASHI *et al.* (p. 161) found 2 peaks, one in children aged 5–9 years, and the other in adults aged 30–50 (presumably infected by children especially while dressing them or washing their clothes). Reinfection was common after treatment, and the authors suggest that the best results would probably come from treating the children at school.

WHITE and SCOPES (p. 742) found a preparation of piperazine phosphate—with or without senna—very effective in the treatment of *Enterobius* infection in children. The dose was the equivalent of 3 gm. piperazine phosphate for children aged 2–5 years, and 4 gm. for those aged 6–12. GOULART (p. 1200) suggests treatment of *Enterobius* infection with piperazine hydrate in 3 phases each of 4 days separated by intervals of 30 days. Dosages are given for the different age-groups. After trials of multiple-dose treatment of *Enterobius* infection in children BECK *et al.* (p. 162) conclude that pyrvinium chloride and pyrvinium pamoate are about equally effective (over 90% cures) but that the pamoate is less toxic to animals. A cure rate of 96% was achieved with the pamoate in a single dose of 5 mgm. per kgm. of body weight, and this offers great advantages, particularly for periodic treatment. In experiments on the treatment of *Enterobius* infection BUMBALO *et al.* (p. 1201) found good results with pyrvinium pamoate and dithiazanine iodide, and moderate results with piperazine citrate.

At a hospital for mental defectives in England PAINE *et al.* (p. 741) found a 5-day course of treatment with dithiazanine iodide (600 mgm. daily), with flaming of paths, dustbins and entrances, and final cleansing of wards by vacuum cleaners, and sterilization, effective in controlling *Trichuris* infection.

Trichinella infection

In a review of the problem of *Trichinella* infection in Poland KOZAR (p. 625) quotes figures to show that it is common in man—38% of people in one area reacted to the intradermal test. He discusses infection in other animals, especially pigs, and the campaign to control it. USZACKA (p. 1202) reports naturally acquired infection in a mink in a farm for furred animals in Poland.

PHILLIPSON and KERSHAW (p. 1296) trace the production, deposition and growth of larvae of *Trichinella* in the muscles of mice given standard doses of infective larvae; they were first recovered from muscle on the 6th day, and by the 17th day they were encysted and infective to new hosts. In man

the earliest time at which trichiniasis is suspected is 10–14 days after infection, and if development in man is similar to development in mice it seems that a search for a drug to reduce the production of larvae by the female worm is hardly worth pursuing, since the drug must be given before the 15th day. The reaction of the host, rather than the direct effect of the parasite itself, is responsible for the clinical manifestations of the disease.

RITTERSON (p. 1202) has found the Chinese hamster refractory to the development of *Trichinella* larvae to the point of infectivity, but this (probably innate) resistance could be greatly reduced by the administration of cortisone.

By labelling antibodies to *Trichinella* (in rabbit antiserum) with fluorescent compounds, and incubating adult *Trichinella* with these antibodies, JACKSON (p. 396) has been able to identify the situation of the antigens in the worms. The primary effective antigens are the digestive secretions and excretions of the worms, which are presumably formed by the cells of the alimentary tract; secondary antigens are in the reproductive organs. By the microculture-agar-gel technique OLSON *et al.* (p. 1091) have shown that *Trichinella* larvae while living in the host liberate 3–5 metabolic antigens, and after death of the larvae 9 others are liberated.

NORMAN and SADUN (p. 270) report on the use of metabolic and somatic antigens for serological diagnosis. Details should be sought in the original. There is apparently considerable overlap between the two antigens.

LARSH *et al.* (p. 272) show that mice exposed to several doses of irradiated or unirradiated larvae of *T. spiralis* developed a degree of immunity associated with serum antibodies and characteristic inflammatory responses in the intestine. The pre-adult stage, therefore, can provoke demonstrable immunity.

INNELLA and REDNER (p. 271) describe a latex agglutination test in which the latex particles are coated with a *Trichinella* extract; the results appeared to be encouraging. TRAWINSKI (p. 836) describes a new gel flocculation test for trichinous meat.

No specific treatment is known for trichiniasis, but cortisone and corticotrophin can alleviate the symptoms; LORD (p. 626) shows that in rats corticotrophin decreased the mortality rate and prolonged the survival time, but cortisone had no beneficial effect and was even toxic in large doses.

Capillaria, etc.

COCHRANE and SKINSTAD (p. 509) report on a child who a few years ago was infected with *Capillaria hepatica* and was treated with antimony; the child, several years later, was apparently normal in every way. Creeping eruption due to nematodes of the genus *Capillaria* (? *C. cutanea*) is reported from Japan by MORISHITA and TANI (p. 835).

RODENBURG and WIELINGA (p. 621) and KUIPERS *et al.* (p. 621) describe from Rotterdam a hitherto undescribed syndrome, acute phlegmonous inflammation of the small intestine due to larvae of the nematode *Eustoma rotundatum*, a parasite of the herring, not adapted to man. Several patients are recorded, and the source was very slightly salted herring. Surgical treatment was indicated.

BIOCCA (p. 731) reports infection of a premature new-born infant with the canine parasite *Spirocerca lupi*.

TAYLOR and TERRY (p. 739) from experiments on cotton-rats infected with

Litomosoides carinii treated with various drugs conclude that developing embryos may be severely affected by doses which do not kill adult worms; presumably the high metabolic rate of the embryo is a factor.

Charles Wilcocks

MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control;* Animal malaria—*monkeys, other animals, birds.*

ALLISON, A. C. & CLYDE, D. F. **Malaria in African Children with Deficient Erythrocyte Glucose-6-Phosphate Dehydrogenase.** *Brit. Med. J.* 1961, May 13, 1346–9, 1 chart. [20 refs.]

In parts of Africa a deficiency of glucose-6-phosphate dehydrogenase (G6PD) occurs in the erythrocytes of 25% of males [this *Bulletin*, 1960, v. 57, 939], and this high incidence of a generally deleterious defect corresponds to some degree with the distribution of *Plasmodium falciparum* malaria. A survey was conducted on 532 African children aged 4 months to 4 years in the Tanga and Korogwe districts of Tanganyika, where malarial transmission is high. Screening tests for G6PD activity were made within 48 hours of the collection of capillary blood; parasite counts and sickling tests were made independently.

There was a significant lowering of the parasite rate in males deficient in G6PD, but this was not so for females; however, in both sexes the proportion of infections with parasite counts above 1,000 per cmm. was significantly lower for enzyme-deficient than for normal children. The results also confirmed the accepted protective role of sickling. The small number of subjects having both sickling and G6PD deficiency did not show greater protection than that provided by either trait alone, though it was noted that the two traits were about equal in their protective effect.

The population genetics of G6PD deficiency are explained as follows. The female heterozygote is resistant to *P. falciparum* malaria, and is therefore at an advantage; the male hemizygote, because of his susceptibility to haemolysis, may be at a slight disadvantage. That he is so is deduced from the fact that the frequency of the abnormal gene nowhere reaches 50%. But the factor precipitating haemolysis under natural conditions is not known; it could possibly be some of the many viral infections from which Africans suffer, and an epidemic is quoted [*Bull. Hyg.*, 1954, v. 29, 452] in which jaundice was noticed to be more severe in males.

Alan B. Raper

DAVID, J. H. S. Subsídios para o estudo da endemia palúdica no concelho do Chitato (Lunda–Angola). [**Endemic Malaria in the Chitato Region (Lunda) Angola**] *Anais Inst. Med. Trop.* Lisbon. 1960, Jan.–June, v. 17, Nos. 1/2, 257–81, 2 figs. [11 refs.] English summary.

This paper deals with an investigation into the incidence of malaria in a region in north-east Angola, carried out in 1959. The area concerned covers over 45,000 km.², varies in altitude from 700 to 1000 metres with a south-to-north slope, and is intersected by numerous rivers of the Kasai (Congo) basin. Nearly 76,000 people live there and filariasis due to *Dipetalonema perstans* affects nearly 50% of the population. 4 *Anopheles* species have been found; *A. gambiae, A. funestus, A. dureni,* and *A. implexus.* In all, 5,484 children between the ages of 2 and 14 were examined for parasitaemia and for splenomegaly; most were aged 2–4 years. For comparative purposes the examination procedures were carried out exactly as suggested by WHO.

The results showed that *Plasmodium falciparum* formed over 99% of all infections and *P. vivax* the minute remainder. No *P. malariae* or *P. ovale* were detected. Most of the *P. falciparum* were in the form of gametocytes though no such forms of *P. vivax* were seen. In the children aged 2–4 the splenic index varied from 55 to 91% and parasitaemia from 35 to 60%.

The author states that this region of the Chitato must be classified among the hyperendemic zones, indeed parts are holoendemic, and since the investigations were made during the dry season it is likely that the infection will be even more extensive during the rains. *W. K. Dunscombe*

SIVALINGAM, V. **The Natural History of Malaria in Ceylon.** *Ceylon Med. J.* (n.s.) 1960, Sept., v. 5, No. 3, 83–105, 9 graphs. [26 refs.]

The author, in his Presidential Address to the Ceylon Medical Association, reviews the clinical features, epidemiology and history of the study of malaria in Ceylon, using the parasitological findings of a prolonged, systematic study. The clinical information includes analysis of the frequency and severity of rigors, and the parasite counts associated with different degrees of fever. He also records the numbers of merozoites seen in erythrocytic schizogony of the three main species, the frequency curves for *Plasmodium vivax* having a peak at 16, for *P. malariae* at 8, while the few *P. falciparum* rosettes seen showed from 6 to 24 without any prevailing figure. The author's epidemiological observations are based on the systematic examination of blood films, before successful control of malaria, from out-patients, and from selected groups of the population in several districts, being designed chiefly to determine the relative frequency of different species of parasite. Quartan malaria was quite common, but was in all areas relatively and absolutely more frequent in the "healthy season", playing no part in epidemics. *P. vivax* infections predominated at all times in the Wet zone, but were superseded at the height of the epidemic by *P. falciparum* and in the inter-epidemic periods by *P. malariae.*

The author's historical account is of special interest in that it traces the known history from about 1880 onwards, giving details of early studies and

actions which built up the now well known picture of transmission by *Anopheles culicifacies* in three epidemiologically distinct zones, the Wet zone with a very low prevalence and very occasional epidemics, the Intermediate zone with seasonal malaria and frequent epidemics, and the hyperendemic Dry zone. *G. Macdonald*

BAER, H. W. *Anopheles* und Malaria in Thüringen. [*Anopheles* **and Malaria in Thuringia**] *Parasit. Schriftenreihe*. 1960, No. 12, pp. v + 154, 1 fig., 20 charts & 1 loose-leaf coloured folding map. [Numerous refs.] Jena: Gustav Fischer Verlag, Villengang 2. [DM. 28.10.] [Summary taken from *Rev. Applied Entom.* Ser. B. 1961, Apr., v. 49, Pt. 4, 90–91.]

"After a list of the six Anophelines that occur in Germany, and notes on their distribution, prevalence and habits there and the ability of each to transmit malaria, former knowledge on the Anophelines of Thuringia is outlined, and a detailed account, including much tabulated information, is given of the results of investigations in 1953–55 on the distribution and abundance of the five found in that region, with data on bionomics, overwintering and influence of weather conditions. The group as a whole was very widespread but by no means abundant. The most plentiful representative of it was *Anopheles maculipennis messeae* Flni., which reached its greatest numbers in the river basins, particularly that of the middle Unstrut; *A. m. maculipennis* Mg. (*typicus*) was more widely distributed but less numerous; *A. labranchiae atroparvus* van Thiel was found in four localities in the north and west, *A. claviger* (Mg.), typically though not exclusively an outdoor species, was virtually limited to the river basins and *A. plumbeus* Steph. was taken on man in a few widely scattered localities in the open.

"In the second part of the book, the history of malaria in Germany and Thuringia is briefly reviewed, and details are given, largely in tables, of the incidence of the disease in the various Thuringian districts in 1945–51, when 1,692 cases, nearly all caused by *Plasmodium vivax*, were diagnosed, and many more must in fact have occurred. About half of the cases were relapses, and nearly all the others were introduced or of doubtful origin. Only 11 cases were recognised as autochthonous and primary, the last of these occurring in 1949. Relapses and introduced primary cases reached their peak in 1948, and the disease practically died out in 1951. The relation between the distribution of the Anophelines and the malaria cases is discussed. It is concluded that the small numbers of Anophelines, which hardly increased under war conditions, together with the good hygienic and nutritional condition of the people were the chief factors that prevented the post-war establishment of endemic malaria."

SENEVET, G., ANDARELLI, L. & REHM, G. *Anopheles multicolor* dans le Tell Algérien. V. Nouveaux gîtes à l'Ouest d'Oran. [*Anopheles multicolor* **in the Algerian Tell. V. New Breeding Places West of Oran**] *Arch. Inst. Pasteur d'Algérie*. 1961, Mar., v. 39, No. 1, 99.

LIPS, M. Anophèles du Congo. 3. Faune des grottes et des anfractuosités. Références-récoltes-répartition et importance médicale actuelle. [**Anophelines of the Congo. 3. Fauna from Caves and Rock Clefts. Distribution, Medical Importance and Review of the Literature**] *Riv. di Parassit.* Rome. 1960, Dec., v. 21, No. 4, 289–306, 1 map. [Numerous refs.]

This useful paper collects the data about the species of *Anopheles* found in the caves and rock clefts (anfractuosities) in the Congo, and correlates them with their animal hosts, several of which are infected with malaria parasites belonging to the four genera *Plasmodium*, *Polychromophilus*, *Hepatocystis* and *Nycteria*.

A. faini has been found only in the Orientale Province in the caves of Mt. Hoyo (altitude 1,210 metres) where it is associated with the fruit bat *Roussettus leachi*. This bat is infected with *P. roussetti*, the vector of which may be either *A. faini* or special species of *Culex* also present in these caves.

A. rodhaini is found only in the Kakontwe cave near Jadotville, where bats occur in profusion. These bats are infected with malaria parasites, probably belonging to the genera *Hepatocystis* and *Polychromophilus*, of which this *Anopheles* has incorrectly been suspected of being the vector.

A. vanhoofi is confined to numerous caves of Thysville (Léopoldville Province) where it is associated with fruit and insectivorous bats. The bats harbour malaria parasites of two types, neither of which is probably a true *Plasmodium*.

A. vanthieli occurs in association with the bush-tailed porcupine in the Irangi-Kivu region (in anfractuosities). This animal is infected with *P. atheruri*, the vector of which is *A. vanthieli*.

A. rageaui, closely allied to the last species and to *A. smithi*, is absent from the Congo, but occurs in the Southern Cameroons. Its habits are like those of *A. vanthieli*, it feeds on the same species of porcupine and is thought to transmit a similar species of *Plasmodium*.

A. cavernicolus is a cave-haunting species absent from Congo, but found in Guinea.

[The taxonomic position of these species is still debatable according to Mr. P. F. MATTINGLY (personal communication), and their vectorial potentialities are largely unknown, though none is likely to transmit human malaria parasites.] *P. C. C. Garnham*

SHAHGUDIAN, E. R. **A Key to the Anophelines of Iran.** *Acta Med. Iranica.* 1960, Apr., v. 3, No. 3, 38–48. [25 refs.]

STAHLER, N. & TERZIAN, L. A. **Comparison of Mating and Biting Behavior in Two Laboratory Strains of** *Anopheles quadrimaculatus*. *Ann. Entom. Soc. of America.* 1961, May, v. 54, No. 3, 453–9, 2 figs.

RANQUE, J., DEPIEDS, R., QUILICI, M. & RANQUE, P. Détermination de l'anthropophilie et de la zoophilie des moustiques par la méthode immuno-électrophorétique. [**Identification of Blood Meals of Mosquitoes by Immune Electrophoresis**] *Bull. Soc. Path. Exot.* 1960, Nov.–Dec., v. 53, No. 6, 935–9, 5 figs. on 5 pls. [11 refs.]

The immuno-electrophoresis of the blood meals of mosquitoes is described and suggested as a method for the identification of these blood meals. Blood meals subjected to electrophoresis gave precipitates with antiserum prepared in horses against human serum in the region of the albumin fraction, while anti-haemoglobin serum gave precipitates on the cathode side. Blood meals other than those of human origin gave no precipitates.

[The authors are apparently unaware of the numerous publications on the subject of identification of blood meals since 1931. The method suggested does not seem practicable for large numbers of identifications and offers no advantage over precipitin tests in tubes. No description is given of the specificity of the sera. However, the method would be of considerable use in the studies of the process of digestion of the blood meals in insects.]

Bernard Weitz

KNÜTTGEN, H. J. Die Entwicklungsstadien der Gametocyten des *Plasmodium falciparum* im Knochenmark nach Anbehandlung mit Resochin. [**Developmental Stages of *P. falciparum* Gametocytes in the Bone Marrow after Treatment with Resochin**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1961, v. 12, No. 1, 9–15, 25 figs. [13 refs.]

In contrast to the few developmental forms of gametocytes generally seen in the bone marrow in infections with *Plasmodium falciparum*, that of a patient infected in West Africa and seen by the author during life had very many such forms. They had been obtained after treatment with resochin. The younger forms showed morphological characters which differed from those described in the literature, and this difference was believed to result from drug treatment which had been initiated 18 hours before samples of marrow were obtained, in amount equivalent to 0·6 gm. chloroquine base. The findings in the stained bone-marrow specimens were similar to those in the peripheral blood; rings were numerous but schizonts very scanty. Developmental forms of gametocytes were present in larger numbers, later stages being barely recognizable.

A description of these developmental forms is given, accompanied by photographs of stained preparations. They differed from the early forms as generally described by having a vacuolated central area, and pigment, instead of being dispersed throughout the cytoplasm, was condensed to a single mass at all stages of development. A comparison is made with the findings of other workers regarding these developmental forms. *J. D. Fulton*

REBELLO, D. J. A. **Ocular Reactions to Antimalarial Drugs.** *Arch. Dermat.* 1961, May, v. 83, No. 5, 785–9, 2 figs. [28 refs.]

"Four cases of retinopathy in patients with lupus erythematosus, who had received chloroquine therapy, are reported. Circumstantial evidence seems to incriminate chloroquine. In view of the hazard of permanent serious visual damage with this type of retinopathy, a plea is made for thorough ophthalmological surveillance of patients on antimalarial drug therapy."

[See this *Bulletin*, 1960, v. 57, 8.]

TARTAGLIA, P. Die Ausrottung der Malaria in Dalmatien. [**Malaria Control in Dalmatia**] *Ztschr. f. Tropenmèd. u. Parasit.* Stuttgart. 1961, v. 12, No. 1, 16–27, 12 figs. [16 refs.]

This paper deals with malaria control and eradication in Dalmatia during the last 40 years.

The first control measures were initiated in 1921. The distribution of the main malaria vectors was determined. The following species were identified:— *Anopheles maculipennis, A. sacharovi, A. superpictus, A. claviger, A. algeriensis, A. hyrcanus* (*sinensis*) [*sic*]. The *A. maculipennis* complex was by far the most widespread. In north Dalmatia they constituted 90% of the *Anopheles* population and in the south 40%. Of the *A. maculipennis* complex *A. maculipennis* and *A. m. messeae* occurred throughout the malaria zone. In the north in some places *A. labranchiae* constituted 30% of the *Anopheles* population. *A. maculipennis* was also numerous. In the south *A. sacharovi* predominated and to a lesser degree *A. m. messeae* and *A. labranchiae*. As a result of measures taken on these data adult mosquitoes and larvae were destroyed, and a marked diminution of malaria infections resulted.

During the Second World War the numbers of malaria cases rose once more. From 1948 to 1958 DDT spraying when applied as a control measure resulted in almost complete eradication of malaria in Dalmatia. Since extermination of malaria has not been achieved in all parts of the country, malaria inspection is being continued and there is every good reason to predict that malaria will no longer be endemic in Yugoslavia.

Philip Manson-Bahr

ADAM, J. P., HAMON, J. & BAILLY-CHOUMARA, H. Observations sur la biologie et le pouvoir vecteur d'une population d'*Anopheles gambiae* résistante à la dieldrine en Haute-Volta. [**Biology and Vector Potentiality of** *Anopheles gambiae* **Resistant to Dieldrin in the Upper Volta Area**] *Bull. Soc. Path. Exot.* 1960, Nov.–Dec., v. 53, No. 6, 1043–53, 3 graphs.

Pala and Borodougou are two villages in Upper Volta which were treated annually with dieldrin from July 1955 (0·5 gm. per sq. m.). Resistance to this insecticide was detected in *Anopheles gambiae* in July 1957, and the mosquitoes remained resistant until the beginning of 1960 when DDT, to which they were still susceptible, was substituted. Observations on this resistant population of *A. gambiae* in Pala and Borodougou from January 1957 until February 1960 are reported in the paper, and comparisons are made with normal susceptible *A. gambiae* in nearby untreated villages. Some comparisons are also made with *A. funestus* in the untreated villages.

Among the features studied and compared were susceptibility to DDT, host preferences, biting cycles, the degree of exophagy, the duration of the gonotrophic cycles, and pregravid rates. There was little difference between the two populations of *A. gambiae* in any of these, but there was a significant difference between them in their response to seasonal climatic changes. The numbers of the dieldrin-resistant population did not fall so markedly during the dry season as did those of the susceptible population, and there was a

corresponding difference in the sporozoite rates. In the case of susceptible *A. gambiae* the sporozoite rate was at its highest during the wet season, and there was a sharp fall at the start of the dry season; the resistant *A. gambiae* on the other hand showed the highest rate at the beginning and at the end of the wet season, and the rate continued high for the first half of the dry season. The fluctuations of the sporozoite rate of *A. funestus* in the untreated villages were comparable to those of the resistant *A. gambiae*.

Since the gametocyte rates of both susceptible and resistant *A. gambiae* were essentially similar, the differences in sporozoite rates are ascribed to differing survival rates of the mosquitoes, resistant *A. gambiae* (and *A. funestus* from the untreated villages) having a higher survival rate at the beginning of the wet season and at the beginning of the dry season than at the height of the wet season. The daily survival rate of resistant *A. gambiae* in Pala and Borodougou was estimated to be about 0·91 at the end of the wet season and at the beginning of the dry season. This compares with figures obtained in earlier work, by different methods, of 0·89 (dry season) to 0·92 (wet season) for susceptible *A. gambiae*, and 0·85 (wet season) to 0·90 (dry season) for *A. funestus*. [See also this *Bulletin*, 1958, v. 55, 1077.]

W. W. Macdonald

OMARDEEN, T. A. **Resistance to Dieldrin in *Anopheles* in Trinidad.** [Correspondence.] *Nature*. 1961, May 6, v. 190, 559–60.

For some years dieldrin has been used as a larvicide against *Anopheles neomaculipalpus* in the Piarco Airport area of Trinidad. This mosquito is of secondary importance to *A. aquasalis* as a vector of malaria in the coastal area. *A. aquasalis* was shown to be resistant to dieldrin in Trinidad in 1958 [this *Bulletin*, 1959, v. 56, 517] and the author has now found such resistance in *A. neomaculipalpus*.

Suspicion was first raised by lack of proper control in the Piarco area. Susceptibility tests were therefore made with freshly blooded wild-caught specimens of *A. neomaculipalpus* by means of the WHO testing kit. Tests with DDT were also included.

A table sets out the results obtained with several tests carried out between July and December 1960. These show that 27% of *A. neomaculipalpus* survived 8 hours' exposure to 1·6% dieldrin papers and 5% survived exposure to 4% for the same period. The species was susceptible to DDT despite residual spraying with that insecticide of houses in nearby villages for several years: the LD50 was about 0·8% DDT. *H. J. O'D. Burke-Gaffney*

GAHAN, J. B., LABRECQUE, G. C. & WILSON, H. G. **Hercules AC-5727 as a Residual Spray for Adult Mosquitoes.** *J. Econom. Entom.* 1961, Feb., v. 54, No. 1, 63–7.

Hercules AC-5727 is a carbamate type of insecticide (*m*-isopropylphenyl methyl-carbamate). It is a grey crystalline material, with a melting point of 76°C., insoluble in water but dissolving in acetone, alcohol and xylene. The acute oral LD50 for rats was first reported as 45 mgm./kgm. but later as 15 mgm./kgm. [*i.e.*, rather highly toxic].

This paper describes laboratory and simple field tests of its action against mosquitoes, a subject important in view of growing numbers of anophelines resistant to chlorinated insecticides. The tests in which mosquitoes were exposed to treated panels were promising. Both against *Anopheles quadrimaculatus* and a few other species, the new compound showed very rapid action when used at doses comparable with other residual insecticides. Its lasting powers appeared to be somewhat better than those of malathion or Baytex. The results of a simple field trial indicated good persistence for at least 20 weeks, when used at 100 mgm./sq. ft. Its action, like that of malathion, was considerably impaired when used on whitewashed baked clay or sun-dried mud brick. *J. R. Busvine*

CORRADETTI, A. & VEROLINI, F. Decorso della reinfezione da *Plasmodium berghei* in ratti albini precedentemente infettati, guariti e splenectomizzati. **[Course of Reinfection in Rats after Recovery from Previous Infection with *Plasmodium berghei* followed by Splenectomy]** *Parassitologia.* Rome. 1960, Apr.–Aug., v. 2, Nos. 1/2, 99–103. English summary.

38 rats that had recovered from an infection with *Plasmodium berghei* were splenectomized 122–318 days after parasites disappeared from their blood. The animals were then reinoculated with the same strain and all became infected, showing parasites 1–2 days later. While 3 of the rats died 5–7 days after inoculation, 29 remained positive till their death 101–223 days later, but 6 animals recovered spontaneously after 13–152 days.

From these experiments it is concluded that the immunity acquired during the primary infection persisted after splenectomy, protecting 92·1% of the animals from death and eliminating the parasites in 15·7% of cases after reinfection. *C. A. Hoare*

BEER, G. **The Behaviour of *Plasmodium berghei* and *Plasmodium vinckei* in the Spiny Mouse *Acomys cahirinus*.** *Bull. Res. Counc. of Israel.* 1961, Mar., v. 9E, No. 1, 37–8.

The author, from the Hebrew University of Jerusalem, studied the susceptibility of the spiny mouse, *Acomys cahirinus* to *Plasmodium berghei* and *P. vinckei*.

P. berghei induced very low-grade infections in 10 intact *Acomys*. The average peak parasitaemia was about 0·02% and lasted for several days. There were no deaths. In 10 splenectomized animals the peak parasitaemia was about 2·4% and lasted 38 ± 19·7 days. There were 3 deaths and 2 animals were radically cured, as shown by failure to produce relapse or infection of a clean mouse. When splenectomized animals were reinfected the peaks were lower than in initial infections in splenectomized animals, namely 0·04%. In 3 cases this increase in immunity was due to premunition (parasites present at the time of inoculation) and in 2 it was shown to be residual immunity after radical cure. In splenectomized *Acomys* crisis forms characterized *P. berghei* infection.

24 *Acomys* were inoculated with *P. vinckei*. No infections were detected

either in intact or splenectomized animals, nor was their splenic tissue infective to mice.

It would seem that *A. cahirinus* is the least susceptible of the rodent hosts so far described for *P. berghei* and more especially for *P. vinckei*.

H. J. O'D. Burke-Gaffney

ZUCKERMAN, Avivah. **Blood Loss and Replacement in Plasmodial Infections. IV. *Plasmodium gallinaceum* and *Plasmodium lophurae* in Untreated and Prebled Mature Chickens and in Untreated Chicks.** *J. Infect. Dis.* 1960, July–Aug., v. 107, No. 1, 133–48, 9 figs. [19 refs.]

In previous papers of this series [this *Bulletin*, 1957, v. 54, 1391; 1959, v. 56, 696; 1960, v. 57, 885] the author described blood changes taking place in rodent and simian malarias. The present investigation is devoted to the haematological picture in fowls infected with *Plasmodium gallinaceum* and *P. lophurae*. The methods and criteria of assessment of the blood changes were the same as in the studies on mammalian malarias but, in the classification of the avian reticulocytes, changes in the nuclear structure as well as the degree of reticulation were taken into consideration in determining the degree of maturity. In the experiments, untreated and pre-bled adult birds and untreated chicks were used.

The results obtained were as follows. There was no marked difference between infections with both parasites in untreated and pre-bled adults. In the case of *P. gallinaceum* all initial infections were severe and fatal, but *P. lophurae* infections were severe in chicks and variable in adults, most of which recovered from the infection. There were pronounced reticulocytic responses in all infections with the two parasites. Blood loss, which was very extensive in adult birds, was in most cases due to rupture of host cells following segmentation of the parasites. Invasion of erythrocytes by merozoites was at random, but while *P. gallinaceum* showed a preference for reticulocytes with scanty reticulation, *P. lophurae* favoured normocytes.

Blood loss and replacement in fowl malarias was compared with that occurring in mammalian malarias, and the reactions were found to be similar in all the hosts examined. In all these cases excessive blood loss is thought to be due to an auto-antibody against the host's erythrocytes, altered in the course of infection.

C. A. Hoare

NYE, Pauline A. **Temperature Studies on Chicks infected with *Plasmodium gallinaceum* (Brumpt, 1935) including Some Effects of Cooling Host and Parasite.** *Exper. Parasit.* New York. 1961, Feb., v. 11, No. 1, 77–89, 10 figs. [15 refs.]

The object of this investigation was to discover if the stages of development of *Plasmodium gallinaceum* in chicks were affected by lowering the host temperature. As a preliminary the developmental period of the parasite in normal hosts as well as the temperature changes undergone by the latter during infection were noted. It was also determined that the complete developmental cycle occupied 36 hours, and was relatively synchronous. Chickens

under 6 weeks of age were used and the strain of *P. gallinaceum* had been maintained by mosquito and blood passage for some years. Infection was by mosquito bite, injection of sporozoites or by blood inoculation. For classification, parasites in blood films were divided into 5 categories according to their stage of development. Sexual stages of the parasite were also counted. The inoculum giving the most synchronous resultant cycle was determined. Rectal temperatures of chickens were recorded at the desired intervals, and a host temperature of 26–30°C. was best obtained by immersion of chicks in running tap-water for about 10 minutes. Immersion for some hours did not prove harmful and the visceral temperatures thus attained were recorded by sacrificing the birds. Blood films were taken at intervals from cooled infected chicks and in some cases mosquitoes were fed on these birds. The effect of cooling sporozoites *in vivo* and *in vitro* was also observed.

There was a slight natural increase in the temperature of normal birds with age. The temperature during infection did not alter till near the peak of parasitaemia, when a slight rise followed by a marked fall occurred, with later return to normal temperature on recovery. The cycle of development was extended beyond 36 hours in the cooled birds. The subsequent course of infection, morphology of the parasites or number of merozoites per schizont were not affected. Oöcyst development in mosquitoes fed on these birds was also normal. The cycle of *P. gallinaceum* appeared to be closely associated with the physiological state of the host and some factor other than temperature may account for changes in parasite development. In chicks alteration of temperature did not occur at schizogony as happens in man or monkeys. [See also this *Bulletin*, 1959, v. 56, 697.] *J. D. Fulton*

TRYPANOSOMIASIS

In this section abstracts are arranged as far as possible in the following order:—African—*human, animal;* American—*Chagas's disease and other trypanosome infections. In each form the following order is followed:*—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.*

Inoki, S., Ono, T. & Sakamoto, H. **Effect of Anti-Tumor Substances on the Drug-Resistance Transformation in** *Trypanosoma gambiense*. [Correspondence.] *Biken's J.* Osaka. 1960, Aug., v. 3, No. 2, 205–7.

Wijers, D. J. B. & McDonald, W. A. **Anal Feeding as a Method of Infecting Tsetse Flies with** *Trypanosoma gambiense*. **II. The Results.** *Ann. Trop. Med. & Parasit.* 1961, Apr., v. 55, No. 1, 46–8.

Batches of *Glossina palpalis* were fed anally [this *Bulletin*, 1959, v. 56, 1223] with defibrinated blood from a monkey infected with *Trypanosoma gambiense*,

and other batches of flies of the same age were allowed to take a normal blood meal. From the 21st day after the infected feed, the flies were induced to extrude a drop of saliva, which was examined for the presence of trypanosomes. On the 28th day, the surviving flies were dissected for salivary gland and gut infections.

The flies fed anally on their first day of life were readily infected (up to 85% of the fed flies) by a newly isolated strain of trypanosomes, especially when the blood was taken at a crisis in parasitaemia in the monkey, corresponding with a high proportion of short-stumpy forms of trypanosome. Anally fed flies also showed a higher proportion of persistent gut infections than flies which fed normally.

It was found that anally fed flies survived badly when they did not receive careful attention and the anal method of infection is not believed to be yet of much practical value for the infection of large numbers of tsetse.

B. R. Laurence

MACHADO, A. de B. Aspectos gerais da biologia das glossinas do grupo *palpalis* existentes em territórios portugueses. [**General Observations on the Biology of the *Glossina palpalis* Group in Portuguese Territories**] Reprinted from *Anais Inst. Med. Trop.* Lisbon. 1958, Sept., v. 15, Suppl. No. 3, 1–59. [Numerous refs.]

An account of the distribution, biology, feeding habits, reproduction and relationships to trypanosomiasis, with a review of the literature.

WELCH, J. R. **Observations on Deciduous Woodland in the Eastern Province of Tanganyika.** Reprinted from *J. Ecol.* 1960, Oct., v. 48, 557–73, 6 figs.

CORSO, P. & FRUGONI, G. Attività fosfatasica alcalina, pseudo-colinoesterasica e lattico-deidrasica del siero nella tripanosomiasi sperimentale della cavia da *Trypanosoma brucei*. [**Alkaline Phosphatase, Pseudocholinesterase and Lactic Dehydrogenase Activity in the Sera of Guineapigs Experimentally Infected with *Trypanosoma brucei***] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1961, Mar., v. 42, No. 3, 145–51, 3 charts.

The English summary appended to the paper is as follows:—

"The alkaline phosphatase, the pseudocholinesterase and the lactic dehydrogenase activities of the serum in the course of trypanosomiasis from T. brucei in guineapig, were studied. Comparing the results obtained in groups of animals in different periods of the disease with those obtained in healthy animals, the following has been noticed: the serum phosphatase activity undergoes very slight oscillations; the pseudocholinesterase activity is inclined to decrease (decrease 42·2%) and the lactic dehydrogenase activity is inclined to rise (increase 73·3%)."

Frugoni, G., Corso, P. & Tallarico, P. Impiego di alcuni antibiotici (penicillina, streptomicina, cloromicetina, aureomicina, terramicina, tetraciclina, spiramicina, novobiocina, oleandomicina, kanamicina, eritromicina) nella tripanosomiasi sperimentale della cavia da *T. brucei*. **[Use of Several Antibiotics in Experimental *Trypanosoma brucei* Infections in Guineapigs]** *Arch. Ital. Sci. Med. Trop. e Parassit.* 1961, Mar., v. 42, No. 3, 133–44. [13 refs.] English summary (8 lines).

The antibiotics were ineffective.

Taliaferro, W. H. & Pizzi, T. **The Inhibition of Nucleic Acid and Protein Synthesis in *Trypanosoma lewisi* by the Antibody Ablastin.** Reprinted from *Proc. Nat. Acad. Sci.* 1960, May, v. 46, No. 5, 733–45, 4 figs. [22 refs.]

Woody, N. C., DeDianous, N. & Woody, Hannah B. **American Trypanosomiasis. II. Current Serologic Studies in Chagas' Disease.** *J. Pediatrics.* St. Louis. 1961, May, v. 58, No. 5, 738–45. [49 refs.]

Reference is made to the first discovery of a human case of infection with *Trypanosoma cruzi* near Corpus Christi in Texas [this *Bulletin*, 1956, v. 53, 421]. Chronic latent cases may be detected by complement-fixation test, with an antigen prepared from the U.S. strain of *T. cruzi*. Accordingly such tests were made on the sera of 500 children under 18 years near Corpus Christi. [For technical details, see original.] 7 sera from children gave positive results, implicating 5 families. Adult members of these families were tested, and 2 adults also gave positive results. The children were 4½–15 years old. They were Latin-American in race and lived on a farm or ranch. Their houses were infected with *Triatoma gerstaeckeri*, and wood-rats and opossums lived nearby. Infected insects were found in 2 of the 5 houses. Attempts to isolate the trypanosome from the blood of these persons were all unsuccessful. 6 of them had histories of past illnesses which might have been trypanosomiasis; and the 2 adults, aged 45 and 53, had had heart disease. It is concluded that human infection with *T. cruzi* of sylvatic origin occurs in this district, but that it is probably transitory in most cases. [For Part I see *J. Pediatrics*, 1961, v. 58, 568; this *Bulletin*, 1961, v. 58, (897).] *F. Hawking*

Wood, S. F. **A Potential Infectivity Index for *Triatoma* harboring *Trypanosoma cruzi* Chagas.** *Exper. Parasit.* New York. 1960, Dec., v. 10, No. 3, 356–65. [14 refs.]

"The contaminative effect of conenose bugs, *Triatoma protracta*, for man and animals is greater for nymphs than adults in relation to number of defecations released over a 6-hour observation period. An infectivity index is proposed for the number of metacyclic parasites present in proportion to non-metacyclic per fecal droplet. The total contaminative potential averaged 5·6 fecal droplets released per nymph and 2·6 per adult. The total number

of parasites per bug averaged 555·8 for 19 different samples from 15 adults and 157·5 for samples from 50 nymphs. Time of first defecation favours 5th instar nymphs for contaminative effect nearest to host immediately after feeding. The number of metacyclic *Trypanosoma cruzi* in 1st fecal droplets released averaged 349·2 per female, 156·8 per male and 154·1 per 4th instar nymph. The total number of metacyclic parasites per bug with complete counts averaged 1954·3 per male (9 ♂♂), 1821·1 per female (6 ♀♀) and 1678 per 4th instar nymph (4 bugs) 34 to 1043 days after the infective blood meal."

Lisboa, Achiléa C. Sôbre a forma congênita da doença de Chagas. Estudo anátomo-patológico de 6 casos. **[On Congenital Chagas's Disease. Anatomo-Pathological Study of Six Cases]** *Rev. Inst. Med. Trop. São Paulo.* 1960, Nov.–Dec., v. 2, No. 6, 319–34, 9 figs. [28 refs.] English summary.

The author, at the University of Bahia, Brazil, performed necropsies on 220 babies and found 6 cases in which Chagas's disease was considered to be congenital. These are described *in extenso*, together with clinical details of the mothers.

2 of the foetuses were macerated and were examined only macroscopically, 2 were premature stillbirths, and 2 premature live births; specimens from these 4 were examined microscopically also. The 2 stillbirth foetuses showed Chagas's myocarditis, granulomatous encephalitis and extensive dissemination of *Trypanosoma cruzi* in many organs including the skin while both showed parasites in the placenta. Of the 2 live premature foetuses, one died in 2½ hours, the other in 5 days. Both showed *T. cruzi* in the myocardium, in 1 without any accompanying myocarditis. None of these 4 showed parasites in the spleen. Infiltration of Auerbach's plexus was found in each.

The author considers that in this form of the disease there is an initial parasitism of the reticulo-endothelial system with subsequent dissemination to other organs, particularly to the muscles, and she states that Chagas's disease is to be regarded as a definite cause of prematurity in endemic cases. All the mothers were infected, but it is considered that this is the first time that the disease has been shown definitely to be congenital. *W. K. Dunscombe*

Pizzi, T. Un derivado imidazólico efectivo en el tratamiento de las infecciones experimentales por *Trypanosoma cruzi*. (Comunicación preliminar.) **[Efficacy of an Imidazole Derivative in Experimental Infections with** *Trypanosoma cruzi***]** *Bol. Chileno de Parasit.* 1961, Apr.–June, v. 16, No. 2, 35–6. English summary (5 lines).

Flagyl [*Bull. Hyg.*, 1961, v. 36, 145 *ter*, 146 *quat*] has been used extensively with success in the treatment of *Trichomonas vaginalis* infections. The present author, in Chile, has tried it experimentally in mice infected with a virulent strain of *Trypanosoma cruzi* and *in vitro* on culture and blood forms of the parasite.

Groups of mice each weighing 20 gm. were infected with *T. cruzi* and given 75 mgm. of Flagyl orally every day for 6 days and then 40 mgm. for

2 days. Equivalent groups of untreated infected mice were also used and all these died with characteristic parasitaemia in 9 days. The treated mice became negative after 3 days and remained negative and in good condition until the 15th day, except for one which showed one trypanosome on one occasion. Thereafter the trypanosomes gradually reappeared in the blood and the mice died in 1 to 1½ months. The drug had no effect on the parasites *in vitro*: this result and the slight delay in the action of the drug *in vivo* suggests that that drug becomes transformed into an active compound in the tissues.

Possibly more prolonged administration would produce better results and this is being pursued in view of the almost complete absence of toxicity of the drug. In any case, these results suggest promise from a new group of non-toxic drugs with a definite action on *T. cruzi*. *H. J. O'D. Burke-Gaffney*

LEISHMANIASIS

In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, mucocutaneous.

Delahousse, J., Guyomarc'h, Y. M. & Hubert, L. M. Kala-azar contracté au Tchad par un militaire européen. [**Kala Azar contracted in the Chad Region by a European Soldier**] *Méd. Trop.* Marseilles. 1961, Mar.–Apr., v. 21, No. 2, 175–9. [11 refs.]

[See this *Bulletin*, 1961, v. 58, 575.]

Medina, R., Romero, J., Goldman, C. & Espín, J. Comprobación del primer perro infectado con kala-azar en Venezuela. [**First Record of Kala Azar in a Dog in Venezuela**] Reprinted from *Gac. Méd. Caracas*. 1960, v. 69, Nos. 10/12, 441–7, 3 figs. & 1 plan. [13 refs.]

De Alencar, J. E. Das Vorkommen der viszeralen Leishmaniasis in Brasilien. [**The Incidence of Visceral Leishmaniasis in Brazil**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1961, v. 12, No. 1, 2–8. [19 refs.]

Fraga de Azevedo, J. Sur le diagnostic du Kala-Azar. [**The Diagnosis of Kala Azar**] *Ann. Parasit. Humaine et Comparée*. 1960, Oct.–Dec., v. 35, Nos. 5/6, 687–703, 3 figs. [30 refs.]

A full account of the data previously published [see this *Bulletin*, 1961, v. 58, 789].

MANSON-BAHR, P. E. C. **The Leishmanin Test and Immunity in Kala Azar.** *East African Med. J.* 1961, Apr., v. 38, No. 4, 165–7.

The author describes some of his interesting work on immunization in kala azar [see this *Bulletin*, 1959, v. 56, 928 ; 1960, v. 57, 693]. The leishmanin test is similar to the tuberculin test. 0·1 to 0·2 ml. of antigen containing 6–10 million killed leptomonads from a culture of NNN medium is injected intradermally. An area of induration after 72 hours is a positive reaction. Use of the serum instead of blood in the NNN medium allows the production of a cleaner, purer antigen.

The test is negative in untreated cases of kala azar, and serial testing suggests that conversion occurs 1–2 months after a full course of treatment. In 82 cured subjects, followed up 1–2 years after treatment, a positive leishmanin test was obtained in 64 (80%). The results were almost identical whether the antigen was prepared from human strains of *Leishmania donovani* or from a rodent strain of leishmania obtained by HEISCH's technique [*ibid.*, 1957, v. 54, 1167]. The test is negative in cases of post-kala-azar dermal leishmanoid where live leishmaniae are still present in the skin.

When living organisms of strains of leishmania isolated from rodents are inoculated intradermally or subcutaneously into human subjects leishmaniomata develop locally, but there is no visceral spread such as occurs with human strains of *L. donovani*. 6–8 weeks after this inoculation the leishmanin test becomes positive. These subjects are now immune to challenge with the human strains. Thus successful immunization can be provided, and the leishmanin test used as an indicator.

This cross immunity between human strains of *L. donovani* and the rodent strains, which suggests antigenic similarity or identity, does not occur between either strain and strains of *L. tropica* of oriental sore. *A. C. E. Cole*

GHOSH, B. K., HALDAR, D. & CHATTERJEE, A. N. **Effect of Mycobacillin on the Metabolism of a Protozoal Organism,** *Leishmania donovani*. *Ann. Biochem. & Exper. Med.* Calcutta. 1960, Nov., v. 20, No. 11, 303–8. [11 refs.]

In treatment of protozoal diseases antibiotics as a group have proved ineffective. CAPPUCCINO and STAUBER have however reported that certain antifungal agents including amphotericin B, fumagillin, xerosin, etc., were active in visceral leishmaniasis [see this *Bulletin*, 1960, v. 57, 111]. The present authors [*ibid.*, 1960, v. 57, 1034] have reported the activity of the antibiotic, nystatin, on leishmanial infections.

In the present paper the activity of an antifungal agent, Mycobacillin, is described. The substance is a polypeptide produced by *Bacillus subtilis*. The strain of parasite and methods used were the same as described [*ibid.*, 1960, v. 57, 460]. Inhibition of endogenous respiration or that in presence of substrates was marked after a time lag of about 20 minutes when a concentration of Mycobacillin from about 30 to 100 μgm. per ml. was used. Anaerobic metabolism was also inhibited. The effect of *p*H of the medium and also of pre-incubation with the drug under different conditions of temperature, and presence or absence of buffer and of substrate on oxygen uptake

were also studied. The results suggested to the authors the need for a clinical trial of Mycobacillin in this infection. *J. D. Fulton*

ERCOLI, N., with the assistance of Rose M. FINK. **Chemotherapeutic Studies on Cutaneous Leishmaniasis.** *Proc. Soc. Exper. Biol. & Med.* 1961, Apr., v. 106, No. 4, 787–90, 1 fig. [10 refs.]

In these studies on cutaneous leishmaniasis mice were infected in the caudal zone of the back with a strain of *Leishmania braziliensis* originally obtained from a human patient, and subsequently maintained for some years in mice. The macroscopic and microscopic picture of the disease could then be easily followed in the skin lesions. Only animals with well defined lesions which took some months to develop were used for treatment. Antimony compounds such as tartar emetic, Fuadin, etc. proved largely ineffective and only a temporary improvement followed the use of pentavalent antimonials, except in one case in which cure resulted with glucantime. The antibiotics amphotericin B and fumagillin and likewise hydroxystilbamidine did not influence the infection although reported to be active in visceral infections [this *Bulletin*, 1960, v. 57, 111]. The changes which occurred in some parasites after treatment, including loss of blepharoplast, are described. *J. D. Fulton*

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

ABD-EL-MESSIH, G. **The Problem of Typhus in Egypt.** *J. Egyptian Pub. Health Ass.* 1961, v. 36, Nos. 1/2, 63–80. [37 refs.]

Typhus in Egypt is mainly of the classical louse-borne or epidemic type. Two severe epidemics occurred during the First and Second World Wars respectively. In addition there have been two peacetime waves, one during the period 1932–35, the other beginning in 1956 and still in progress. The most heavily infected part of the country in all these epidemics has been the Behera Province of Lower Egypt.

The two peacetime waves are thought to be due to recrudescent typhus cases rather than to economic depression or to gradual exhaustion of immunity in the population, as has been suggested in some quarters.

In recent years the character of the disease has changed from the frank severe type formerly encountered to a mild subclinical type. This is attributed to a change in the character of the virus.

Three main measures of prevention are advocated: (1) improved education coupled with the raising of the socio-economic standard of the population; (2) the use of residual insecticides to combat lice; and (3) vaccination with live, avirulent strain E vaccine.

Since lice in Egypt are becoming progressively more resistant to residual insecticides, these should be reserved for emergencies, and not used as a regular 4-month mass dusting of the population as has been practised hitherto.

The author proposes the establishment of a typhus research unit to fill the gaps in our knowledge of the epidemiology of typhus in Egypt.

G. Covell

ZARNEA, G., MITRICĂ, Natalia & IONESCO, Honorina. La réaction de précipitation en gel avec des antigènes rickettsiens. [**The Precipitation Reaction in Gel with Rickettsial Antigens**] *Arch. Roumaines Path. Expér. et Microbiol.* 1961, Mar., v. 20, No. 1, 13–19, 2 figs.

A study of soluble and particulate antigens of *Rickettsia prowazeki* by the Ouchterlony technique, with rabbit antisera, showed that a specific antigen could be distinguished by adsorption methods from non-specific antigens present in both preparations (obtained by ether treatment and differential centrifugation of yolk sac cultures).

The precipitation reaction could be obtained only with fresh non-inactivated sera, and could not be correlated with the titre of complement-fixing antibody.

R. S. F. Hennessey

WEYER, F. Zur Frage der Widerstandsfähigkeit von Rickettsien im Läusekot gegen physikalische Einflüsse, insbesondere gegen Wärme. [**Capacity for Resistance of Rickettsiae in Louse Faeces against Physical Agencies, especially against Heat**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1961, v. 12, No. 1, 78–92.

The author used 3 strains of *Rickettsia prowazeki*, 1 strain of *R. mooseri* from Mexico, and 1 strain of *R. quintana* from Yugoslavia. Human body lice were infected with these strains by intrarectal inoculation and the period of survival and resistance to higher temperatures of these organisms in the faeces was tested and found to be enhanced. The maximum toleration for *R. mooseri* was 30 minutes at 65°C.; for *R. prowazeki*, 10 minutes at 70°C.; and for *R. quintana*, 10 minutes at 85°C. When the same strains of rickettsiae contained in the faeces, or in the louse mid-gut, were suspended in broth they were all killed within 10 to 15 minutes at 50°C.

Faecal samples were kept at room temperature and also in the refrigerator at 4° to 5°C., before being injected rectally into lice. At room temperature *R. mooseri* rarely survived in faeces for more than a week but some were infective up to 13 days and exceptionally 31 days. Under similar conditions *R. prowazeki* and *R. quintana* were viable up to 38 days and 129 days, respectively. When the faecal samples were stored in the refrigerator the survival periods were much longer, *R. mooseri* 90 days (exceptionally 134 days), *R. prowazeki*, 200 days, and *R. quintana* was still alive after 1,312 days.

It is evident that both low humidity and low temperatures favour the survival of rickettsiae and the higher resistance in louse faeces must be an important factor in the preservation of these organisms under natural conditions.

Edward Hindle

GIROUD, P., CAPPONI, M. & DUMAS, N. Comparaison entre *Rickettsia sennetsui* et *Rickettsia tsutsugamushi*: morphologie, pouvoir pathogène, pouvoir antigénique. [**Comparison between** *Rickettsia sennetsui* **and** *R. tsutsugamushi*] *Bull. Soc. Path. Exot.* 1960, Nov.–Dec., v. 53, No. 6, 960–65, 2 figs. on pl.

This is an account of observations, some by the authors and some by other workers, on strains of *Rickettsia sennetsui* [isolated in Japan from patients with a syndrome resembling glandular fever, this *Bulletin*, 1960, v. 57, 576] and *R. tsutsugamushi*. While the organisms have many features in common, *R. sennetsui* is more polymorphic, sometimes resembling pasteurellae in size and bipolar staining properties; cross-immunity tests in mice showed that neither organism conferred protection against the other, while rabbits inoculated with *R. sennetsui* developed antibodies which agglutinated the homologous organism feebly and did not agglutinate *R. tsutsugamushi*.

R. S. F. Hennessey

BREZINA, R. & URVÖLGYI, J. **Extraction of** *Coxiella burneti* **Phase I Antigen by means of Trichloroacetic Acid.** [Correspondence.] *Acta Virologica*. Prague. 1961, May, v. 5, No. 3, 193.

ZARNEA, G.; ALEXANDRESCO, N.; ANGELESCO, G.; HODOȘ, G.; MLADIN, H.; VOICOULESCO, R.; IONESCO, Honorina; KRAUSZ, N. La valeur de la radiophotographie appliquée à l'étude des endémo-épidémies de fièvre " Q ". Note I. Observations radiologiques [**The Value of Radiography as applied to the Study of Q Fever Endemo-Epidemics. I. Radiological Observations**] [ZARNEA, ALEXANDRESCO, ANGELESCO, HODOȘ, MLADIN & VOICOULESCO]. *Arch. Roumaines Path. Expér. et Microbiol.* 1960, Dec., v. 19, No. 4, 507–15, 6 figs. [11 refs.] Note II. Corrélations clinico-épidémiologiques et de laboratoire [**II. Clinical, Epidemiological, and Laboratory Correlations**] [ZARNEA, ALEXANDRESCO, ANGELESCO, VOICOULESCO, IONESCO & KRAUSZ]. *Ibid.*, 518–26, 3 graphs.

I. While radiological changes in the lungs are not uncommon in Q fever, their variability and the difficulty of distinguishing them from virus pneumonia has made them of limited value in diagnosis.

The authors had the opportunity of studying an outbreak of Q fever among the personnel of a large mixed farm in Rumania. This occurred in two waves, in 1956 and 1958. Of the 360 persons examined, 235 showed neither clinical illness nor serological change, while 125 showed serological changes indicative of infection. Of these 125, however, only 63 had clinical symptoms, and in 48 these were severe enough for the patients to be admitted to hospital. 20 of these showed radiological changes. 6 of the asymptomatic persons showed radiological changes also. Radiological survey of the 235 uninfected persons showed changes in no less than 61; however, these changes were mainly sclerosis, emphysema, and calcified primary complexes; active pulmonary tuberculosis was also picked up and in 8 persons what was thought to be the effects of virus pneumonia.

The radiological appearances observed in association with Q fever were:

(1) single or multiple opacities, often rounded, homogeneous but of low density, having a ground glass appearance, situated in the middle or lower zones toward the periphery, possibly lobar or segmental, and without any hilar involvement;

(2) a hazy shadow of the lower lung fields with irregular margins, often associated with pleural involvement, and liable to fluctuate in extent;

(3) a reticulation and increase in lung markings of the lower zones of peribronchial or even miliary appearance.

The radiological appearances in the first outbreak were mainly of type (1) while in the second outbreak type (3) predominated. These changes took 2–5 weeks to resolve. The most important point in the radiological diagnosis of Q fever was the complete absence of any changes in the hilar shadows.

II. More intensive serial studies were made of 25 patients. These originally had normal radiographs. They were followed by clinical observation, serial radiographs, and serial complement-fixation tests, over a period of 640 days. Whereas radiological changes occurred early (approximately 40% in the first 10 days, 20% in the second 10 days, 11% in the third 10 days, and 29% in the remaining period), serological changes were much later (approximately 14% in the first 10 days, 23% in the second 10 days, and 63% thereafter). Help in diagnosis might be obtained from the second day by radiology, whereas serology was only being useful by the 20th day. 5 clinical protocols illustrative of these points are given.

Another point noted was the correlation between clinical picture, titre of complement-fixation test, and percentage showing radiological changes. Of serologically positive patients without clinical symptoms only 10% developed radiological changes, whereas of those with clinical symptoms 41% developed radiological changes.

The authors conclude by advocating radiological survey of febrile patients in the diagnosis of Q fever under epidemic conditions. *A. C. E. Cole*

YELLOW FEVER

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

Combescot de Marsaguet, G. & Thomas, J. Les états encéphalo-méningés succédant aux vaccinations antivariolique et antiamarile associées ou isolées. **[Meningo-encephalitic Reactions to Smallpox and Yellow Fever Vaccines administered Singly or in Combination]** *Méd. Trop.* Marseilles. 1961, Mar.–Apr., v. 21, No. 2, 115–28. [Numerous refs.]

26 reactions involving the central nervous system were observed by the authors during a smallpox—yellow-fever vaccination campaign they conducted in April–May 1958 on the urban population of Pointe Noire in the then Middle Congo, French Equatorial Africa. These post-vaccination reactions developed in 24 Africans—one of whom, an 8-year-old boy, 3½ years after

simultaneous immunization against both diseases, had been revaccinated against smallpox only—and in 2 European children, one of whom had been vaccinated only against smallpox, the other only against yellow fever.

After a detailed account of the clinical histories of 4 children, who, after vaccination, had developed symptoms and signs characteristic of a meningo-encephalitic syndrome, the authors discuss the (i) aetiology, (ii) symptomatology, (iii) pathology and (iv) treatment of these post-vaccination reactions.

As regards (i): the occurrence of 26 reactions, of which 23 followed administration of the combined prophylactic (dried smallpox vaccine and Dakar yellow fever vaccine by scratch), represents an incidence rate of 0·5 per 1,000 persons immunized—a rate definitely higher than that to be expected after smallpox vaccination alone (*e.g.* 0·3 per 1,000 in Holland). That the frequency of reactions in the present series can be ascribed to simultaneous immunization with both vaccines is, however, but a hypothesis. The influence of age on incidence is shown by the fact that among the 26 cases, 21 occurred in children less than 5 years old, 4 in children between 5 and 10 years and only 1 in an African of 22 years; highest incidence (14 cases) was in children between 2 and 3 years old. In all but 1 case reactions followed primary vaccinations. Sex did not seem appreciably to have influenced incidence, nor was incidence the effect of any concomitant affection present in the area at the time.

As regards (ii): the onset of illness, which was sudden and without prodromal symptoms, was mostly noted 10 to 13 days after vaccination. A febrile state (40°C. and over) persisted 6–11 days, during which the symptomatology characteristic of a meningo-encephalitic syndrome was invariably present. Despite the obvious gravity of the condition, recovery was usually complete, convalescence being uneventful and unaccompanied by any nervous sequelae. There were, however, 2 deaths, both in Africans, one in a child aged 2 years, the other in a woman aged 22, and there was one case of residual paralysis in a European child vaccinated only against smallpox. Neither the time of onset of illness nor the clinical picture makes it possible to ascribe the condition to one or the other vaccine in the combined prophylactic.

As regards (iii): the pathological picture was one of perivascular demyelinization, the lesions being identical with those seen in the post-infective encephalitis occasionally associated with such exanthemata as measles, chickenpox and whooping cough.

As regards (iv): treatment was routinely administered as follows:—(a) ice packs, anti-convulsants (Gardenal, Diparcol), antihistamines (Phenergan) and sedatives of various kinds to combat hyperpyrexia and control nervous manifestations; (b) subcutaneous perfusion of serum (with glucose or salt added) and nasal feeding with milk, eggs, cocoa, and farinaceous foods to maintain metabolic equilibrium; (c) corticosteroid hormones and related compounds for anti-inflammatory and anti-allergic therapy; and (d) various antibiotics (penicillin, streptomycin, aureomycin) to prevent secondary infections. The success of this treatment is reflected in the results obtained: only 2 (7·7%) deaths among 26 cases and 1 instance of residual paralysis, compared, *e.g.*, with a mortality of 20–60% among persons developing encephalitis after smallpox vaccination and an incidence of 10–20% of nervous sequelae, particularly among very young children.

Finally, in order to reduce the risk of such post-vaccination reactions the authors recommend: smallpox vaccination during the first months of life; temporary suspension of vaccination in areas where an unusual number of encephalitis cases of whatever nature is occurring; non-vaccination of children who have recently had measles, chickenpox, whooping cough, or shingles and of persons suffering from eczema or nephritis; and avoidance of simultaneous immunization against smallpox and yellow fever. *G. Stuart*

DENGUE AND ALLIED FEVERS

RUDNICK, A. & HAMMON, W. McD. **Newly Recognized *Aedes aegypti* Problems in Manila and Bangkok.** *Mosquito News.* 1960, Sept., v. 20, No. 3, 247–9.

Epidemics of "haemorrhagic fever" occurred among children in Manila in 1956 and in Bangkok, Thailand, in 1958. Both epidemics were during the rainy season. The aetiological agent of the Manila epidemic was shown to be strains of two new viruses, dengue 3 and dengue 4, while from the Bangkok cases dengue 2 and Chikungunya viruses, the latter previously known only from Africa, were isolated. *Aedes aegypti* mosquitoes yielded dengue 3 virus in Manila and dengue 2 in Bangkok and the authors consider this species as the most likely vector. The recovery of dengue 3 from *A. aegypti* probably represents the first isolation of a dengue virus from wild-caught mosquitoes [*Bull. Hyg.*, 1960, v. 35, 830].

Large numbers of *A. aegypti* were collected from urban houses in both Manila and Bangkok and, judging from daytime resting collections, *A. aegypti* mosquitoes were only second in abundance to *Culex quinquefasciatus* [*fatigans*]. Typical breeding places of *A. aegypti* in Bangkok were large earthenware jars used for storing rainwater, flower vases, water-containing ant barriers and the bilge water in the numerous small boats on the rivers and "klongs". In some houses, larvae of *A. aegypti* were purposely kept in open pans as a source of food for pet fighting fish.

No efforts to control *A. aegypti* in Manila and Bangkok during or after the epidemic have been made, probably because of more pressing public health problems. However, in malarious areas of both the Philippines and Thailand (the urban areas of Manila and Bangkok are not within the malaria zones) *A. aegypti* is not found, and the authors suggest that its control is probably a side result of *Anopheles* control. *M. G. R. Varma*

RABIES

SOAVE, O. A., JOHNSON, H. N. & NAKAMURA, K. **Reactivation of Rabies Virus Infection with Adrenocorticotropic Hormones.** *Science.* 1961, Apr. 28, v. 133, 1360–61.

12 guineapigs were inoculated intramuscularly with about 650 mouse ICLD50 of rabies street virus obtained from the submaxillary gland of a skunk. 1 died after 23 days but virus was not recovered from its brain. 5 others were proved to have died of rabies after 37, 37, 40, 47 and 56 days respectively. One other showed symptoms after 38 days but recovered. 20 weeks after inoculation the 6 survivors were tested for neutralizing antibody: 3 had antibody and 3 none detectable. They were then given 10 units of corticotrophin subcutaneously on alternate days. On the 7th day after treatment began 1 guineapig without antibody developed weakness in the leg originally inoculated with virus. By the 9th day both hind legs were paralysed and it died after 13 days (*i.e.* 154 days after rabies infection). Virus was isolated from brain but not from spinal cord or salivary glands. The remaining guineapigs remained healthy. *C. E. Gordon Smith*

VILLA R., B. & JIMENEZ G., A. Acerca de la posición taxonómica de *Mormoops megalophylla senicula* Rehn, y la presencia de virus rábico en estos murciélagos insectívoros. [**Taxonomic Position of the Insectivorous Bat, *Mormoops megalophylla senicula* and the Presence of Rabies Virus in it**] *An. Inst. Biol.* Mexico. 1960, v. 31, Nos. 1/2, 501–9, 1 fig.

THIODET, J., MASSONNAT, J. & FOURRIER, A. Tentatives thérapeutiques dans la rage humaine déclarée (25 cas). [**Therapeutic Trials in Rabies**] *Bull. Acad. Nat. Méd.* 1961, v. 145, Nos. 12/13, 254–6.

About 9 deaths from rabies occur annually in Algeria and these result almost entirely from dog bites, although cats and jackals are occasionally implicated.

Between 1955 and 1960, the authors saw 25 cases in the El-Kettar Hospital in Algiers. 11 patients had not been vaccinated against rabies after the bite, 4 developed symptoms less than 15 days after vaccination and the remainder thereafter. The incubation period ranged from 19 days to 9 months (average 40 days). In vaccinated subjects, it averaged 31 days for those bitten on the face and 40 days for the remainder.

4 patients died about the time of admission. Of the remainder, 6 were given sedation with a lytic mixture (largactil [chlorpromazine] + dolosal + phenergan [promethazine]) and the other 15 were submitted to tracheotomy and positive pressure ventilation by means of the Engström apparatus. 12 of these received curarization either with *d*-tubocurarine or flaxedil [gallamine].

The average survival period in the 6 patients who received the lytic mixture was 4 days, in those 12 having positive pressure respiration after curarization it was 6 days (in 2 cases up to 9 and 11 days, respectively) and in the 3 who had no curarization it was 2, 5 and 7 days. It would seem that it was thus

possible to prolong the lives of these patients; moreover, curarization has the advantage that it saves the patient the distress of an agonizing death.

As a result of this encouraging experiment the authors propose to pursue the possibilities of what seems to be the only symptomatic treatment of rabies of any value. They suggest that the fixation of rabies virus in the central nervous system may be only temporary, as is the case with tetanus toxin: and that if the patient can be tided over this period he might well develop sufficient immunity to neutralize the virus, so long as the changes wrought by it are not irreversible.

They stress the need for rigorous attention to antirabies vaccination and completion of course. The use of hyper-immune serum within 48 hours of the bite, followed by vaccination, is a distinct advance in rabies prophylaxis [this *Bulletin,* 1956, v. 53, 434]: between 1957 and 1960, they have treated 122 persons bitten by rabid or suspected rabid animals, either with serum and vaccine or with "reinforced" vaccine, without a failure.

H. J. O'D. Burke-Gaffney

SCHNURRENBERGER, P. R. & RUSSELL, J. H. **A Rabies Control Program in Ohio.** *Pub. Health Rep.* Wash. 1961, Apr., v. 76, No. 4, 281–6, 4 figs.

The total number of cases of animal rabies in the State of Ohio during the 3-year period 1955–57 was 831, with 508 cases in dogs. During the same period in the extreme southern portion of the State, in the three-county area of Jackson, Lawrence and Scioto, where enzootic rabies had prevailed for years, there were 327 cases of rabies in dogs. These 3 southern counties, therefore, with an estimated 1% of the State's dog population, were responsible for 65% of the reported cases of canine rabies in the whole State. Moreover a breakdown of the animal species with the disease during the 3-year period in the three-county area showed that over 95% of the reported cases were in dogs, with less than 5% in wild life. Further analysis revealed that about 1 in every 4 cases of rabies was in a stray dog.

In an endeavour to deal with the serious public health problem created by the continuance and extension of the enzootic, rabies control programmes were started in the 3 counties: in Jackson in April 1957, in Lawrence in March 1958 and in Scioto in May 1958. The approach to the problem was four-fold: (i) education, (ii) immunization, (iii) control of stray dogs and (iv) surveillance of wild life. As regards (i), to combat public apathy, the cost of antirabies treatment of exposed persons, as well as the threat to public health, was stressed; educational programmes in schools made children and their families alive to the situation and publicized in advance the centres where animals in any particular area could be vaccinated. As regards (ii) the main objective was to vaccinate unlicensed dogs, it being assumed that persons who had taken out dog licences would arrange for their own animals' immunization. At least 2 vaccination clinics were held in each well-populated area, and for vaccination (with chick-embryo vaccine) dogs did not require to have been licensed. In this latter connexion it is of interest to observe that in Lawrence County, where in 1 month over 6,000 dogs were immunized, only 2,897 had been licensed. As regards (iii) a country-wide 90-day quarantine was the final step in intensifying the control of stray animals;

any dog found running loose was impounded and none was permitted to leave the pound without first having been immunized. As regards (iv) this part of the control programme was confined to surveillance. Whenever possible a definite diagnosis on wild-life deaths was sought and reports of wild life seen behaving suspiciously were investigated.

The success of these measures is reflected in the diminished incidence of canine rabies in the three-county area where, in the 24 months since the last control programme was concluded in June 1958, there have been only 2 cases. Moreover the decline in incidence in this area has been accompanied by a remarkable reduction in the number of cases of canine rabies for the whole State: the 1953–57 mean of 152 dropped to 71 cases reported in 1958, to 15 in 1959 and to 9 in 1960. Only 22 cases of canine rabies were reported for the whole State in the 12 months following the last control programme. This decrease in incidence has so altered the species distribution of rabies in Ohio that the major emphasis in control is being shifted from the canine to the wild-life population. In 1959, 70% of the cases were in wild life and only 14% in dogs. *G. Stuart*

CHOLERA

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

GHOSH, S. N. & MUKERJEE, S. **Neutralization of Cholera Bacteriophages by Extracts of** *Vibrio cholerae*. *Ann. Biochem. & Exper. Med.* Calcutta. 1960, Sept., v. 20, No. 9, 251–6. [13 refs.]

Extracts of all the 5 phage types of *Vibrio cholerae* [this *Bulletin*, 1958, v. 55, 651] and El Tor strains inhibited completely the activity of Group II phages, irrespective of their sensitivity to this phage group, but extracts of non-agglutinating (NAG) vibrios had no neutralizing effect on the Group II phages. Group III phages were inactivated only by extracts of strains sensitive to this group of phages. On the other hand Groups I and IV phages were not inactivated by any of the extracts. *H. J. Bensted*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

BURROWS, R. B. **Prevalence of Amebiasis in the United States and Canada.** *Amer. J. Trop. Med. & Hyg.* 1961, Mar., v. 10, No. 2, 172–84. [116 refs.]

The author has collected together the results of 166 surveys of the prevalence of *Entamoeba histolytica* made in North America from 1945 onwards.

He has expressed the results in a series of tables which record the types of patients surveyed, the average number of specimens examined per patient, the techniques used, the number of patients in each survey, the percentage actually found harbouring *E. histolytica,* and the estimated true percentage determined by a correction factor derived from the paper by SAWITZ and FAUST [this *Bulletin,* 1942, v. 39, 765].

Figures from surveys distinguishing between large and small races showed that the large race formed 34% of the total in Alaska and Canada, 43% in the northern United States, 53% among military personnel and veterans, and 57% in the southern United States. After these figures were applied as correction factors to the average estimated true percentage, the prevalence of the large race of *E. histolytica* was found to be 3% in Alaska and Canada, 6% in the northern United States, and 10% in the southern United States.

The author points out that a large proportion of the surveys were carried out on hospital patients or inmates of institutions and that the figures are therefore probably too high for the general population of the areas concerned. He estimates that the true figures are probably about 1% for Alaska and Canada, 2–4% for the northern United States, and 4–6% for the southern United States.

He recommends that there should be more surveys particularly of the general population and that several specimens should be examined from each subject. He thinks that the techniques used should include a saline preparation, temporary stains for cysts and trophozoites, a concentration technique for cysts, and the use of a haematoxylin stain.

[This paper should do much to counteract the somewhat alarmist estimates of up to 20% prevalence of amoebiasis in the United States. See, for example, *ibid.*, 1942, v. 39, 554.] *W. P. Stamm*

SHAFFER, J. G., SCANLAN, T. M. & IRALU, V. **Observations on Cell Division of *Entamoeba histolytica* in Culture.** *Amer. J. Trop. Med. & Hyg.* 1961, Mar., v. 10, No. 2, 167–71, 4 figs.

The process of division of cultivated *Entamoeba histolytica* [this *Bulletin,* 1960, v. 57, 125] was observed by phase contrast microscopy and recorded on cinematograph film: it involved simple binary fission with the amoeba first becoming oval and then dumb-bell shaped: the daughter individuals then pulled apart, stretching the narrow band of cytoplasm still connecting them until it suddenly broke. Often a thin line remained connecting the two amoebae for some time. Division took from 3 to 8 minutes. Unfortunately the nuclear behaviour could not be observed by the technique used, but nuclear division appeared to be completed before cytoplasmic division commenced. Sometimes one of the division products would immediately divide again, often giving rise to one normal and one very small trophozoite.

A process suggestive of conjugation was frequently seen in which two amoebae became apposed to each other and the membranes at their point of contact seemed to break down: after a few seconds the two amoebae separated again.

The authors point out that it was difficult during the observations to maintain constant temperature of 37°C. and they suggest that the division into

three might represent an abnormal process. [One wonders how far any of the behaviour of the amoebae under these conditions can be regarded as typical of that shown in their normal environment.]

The paper is illustrated by 3 series of interesting enlargements from the film, showing the processes of division and "conjugation", and one showing a trophozoite with 2 nuclei. *J. R. Baker*

MAGAUDDA-BORZI, L. & PENNISI, L. Studio di nuovi antigeni grezzi estratti da *E. histolytica*. [**Study of Antigens extracted from** *Entamoeba histolytica*] *Parassitologia*. Rome. 1960, Apr.–Aug., v. 2, Nos. 1/2, 207–15. English summary.

The authors describe various methods for extracting antigens of *Entamoeba histolytica*, which were tried in complement-fixation tests with the same immune serum. Extractions were made by cryolysis (− 20° and + 37°C. repeated 5 times), with alcohol, trichloracetic acid, deoxycholate and phenol (Phenamacin). The best antigenic values were obtained with Phenamacin by the following procedure: to each gramme of suspension of amoebic culture (containing 500,000 "trophozoite units" per cc.) are added 19 cc. of phenolic acid; the mixture is placed in a bottle and shaken, after which one volume of the phenol extract is mixed with 3 volumes of acetone; the resulting abundant precipitate (Phenamacin proper) is centrifuged and washed, then triturated and resuspended in saline to produce a volume containing exactly 500,000 "trophozoite units" per cc. (*v. supra*).

Adequate antigens were also obtained by cryolysis, but extracts produced by other methods were of poor quality. *C. A. Hoare*

BARRETO, M. P. Diagnóstico da amebíase crônica. Estudo comparativo da eficiência dos métodos de Faust & col. e de Telemann-Rivas, usados sós ou combinados com o exame de esfregaços corados pela hematoxilina férrica. [**Diagnosis of Chronic Amoebiasis. Comparative Study of the Reliability of Faust's and Telemann-Rivas's Techniques, used either Separately or Combined with Iron-Haematoxylin Staining of Smears**] *Rev. Inst. Med. Trop. São Paulo*. 1960, Nov.–Dec., v. 2, No. 6, 305–12. [20 refs.] English summary.

This work was carried out in the Department of Parasitology of the University of São Paulo, Brazil. The author compared the efficacy of Faust's, Telemann's and the iron-haematoxylin methods for the detection of trophozoites and cysts of *Entamoeba histolytica* on a series of patients as follows.

(i) In tests of faeces from 100 patients with chronic asymptomatic amoebiasis, Faust's method was found to be by far the best, though the other two did not differ much. Examination was made of faeces collected by sigmoidoscopy, from (ii) 105 patients with large-size cysts; (iii) 75 patients with small-size cysts; (iv) 45 patients with a mixed infection of both races of cysts. Faust's method again proved much superior in all, but the percentage positive by both the Faust and the iron haematoxylin method was considerably higher for the large race cysts than for the smaller race. The author suggests

that this indicates that there is a larger fluctuation in the elimination of the small race cysts by carriers, or that perhaps for this type of cyst the zinc-sulphate method is not so effective. *W. K. Dunscombe*

KIRCHNER, C. Die Behandlung der Amöbenruhr mit Resotren compositum. [**The Treatment of Amoebic Dysentery with Resotren Compositum**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1961, v. 12, No. 1, 35–40.

The action of this anti-amoebic drug, Resotren compositum, is assessed by the study of 59 patients suffering from chronic intestinal amoebiasis, amoebic dysentery and hepatic amoebiasis, treated at the Tropeninstitut, Hamburg, during the last 5 years. All patients suffering from acute amoebic dysentery received the combined treatment of Resotren and Yatren (quinoxyl) enemata. Patients with amoebic liver abscess were treated with Resotren combined with emetine injections or Resochin (chloroquine). In amoebic hepatitis Resotren was given alone and in chronic amoebiasis it was given either alone or with Yatren enemas.

Resotren compositum was well tolerated. There were only 3 complaints of intestinal troubles or diarrhoea. In all 59 cases Resotren compositum treatment relieved the patients of their symptoms and eliminated the amoebae from the intestines. In 14 patients in whom follow-up examinations of stools were made no recurrence of amoebic infection could be ascertained.

Philip Manson-Bahr

SALEM, H. H. & MORCOS, W. M. **Preliminary Clinical Trials with Chlorophenoxamide in Intestinal Amoebiasis.** Reprinted from *Alexandria Med. J.* 1960, Nov., v. 6, No. 6, 634–40.

The authors from the Faculty of Medicine, Alexandria University, used mebinol in a dosage of 1·5 gm. daily for the treatment of 4 patients with proved amoebic dysentery, 13 with "chronic symptomatic intestinal" amoebiasis and 10 cyst carriers without symptoms.

In the patients with proved dysentery, clinical response occurred in 2 to 3 days and in these and all the others parasitic response usually occurred in 3 to 5 days. However in the group with various gastro-intestinal symptoms there was little clinical improvement unless associated conditions were also treated: they probably had a post-dysenteric colitis.

No toxic effects were noted nor was any relapse recorded in observation periods of 4 to 12 weeks. *H. J. O'D. Burke-Gaffney*

ATCHLEY, F. O., AUERNHEIMER, A. H. & WASLEY, M. A. **Electrophoretic Studies of Blood Serum Proteins in Guinea Pigs inoculated with** *Entamoeba histolytica*. *J. Parasitology*. 1961, Apr., v. 47, No. 2, 297–301, 1 fig.

"Electrophoretic patterns of blood serum proteins from guinea pigs were compared before and after experimental infection with virulent or avirulent strains of *E. histolytica*. Quantitative changes were decreased albumin and

increased globulins as described. Injurious effects were observed in the presence of infections with the virulent strain only, and the severe cases of amebiasis generally showed the greatest changes in protein fractions. Separation of alpha-2 globulin into two peaks was noted especially in severe cases."

CHAUDHURI, R. N., SAHA, T. K. & ROY, N. **Amebiasis—an Experimental Study.** *Amer. J. Trop. Med. & Hyg.* 1960, Sept., v. 9, No. 5, 506–11, 7 figs. [20 refs.]

In the method of screening anti-amoebic drugs by the infection of rats or other animals intracaecally with cultures of *Entamoeba histolytica* followed by drug treatment [this *Bulletin,* 1947, v. 44, 313] various drawbacks are encountered. Not least of these is that all animals, whether treated or controls, are killed after a period without it being known whether they are infected. An attempt was made to avoid these drawbacks by insertion of a hollow silver tube into the caecum and the establishment of a permanent communication between the caecum and the exterior [*ibid.,* 1960, v. 57, 374]. By this means the course of infection in guineapigs was followed in controls and in animals treated with drugs by withdrawing samples of the caecal contents.

In 25 control animals the course was acute and fatal, ulcers were present in the caecum and trophozoites were numerous. The nature of the infection in 63 guineapigs treated with a variety of recognized amoebicidal agents was followed by daily examination of caecal contents. Half the animals failed to respond to treatment and died, while relapses as in chronic intestinal amoebiasis occurred in others. The results are summarized in a table.

The authors concluded that the tube was a useful aid for screening procedures and in following the natural course of infection. Increase in weight of liver was observed in relapsing animals and sometimes cutaneous amoebic ulcers resulted from contamination. The relative efficiency of the various drugs was not determined. *J. D. Fulton*

BERBERIAN, D. A., SLIGHTER, R. G. & SURREY, A. R. ***In vitro* and *in vivo* Amebicidal Activity of N,N′-Bis(dichloroacetyl) diamines.** *Antibiotics & Chemotherapy.* New York. 1961, Apr., v. 11, No. 4, 245–55. [22 refs.]

Earlier work by the authors, with compounds related to those described in the present investigation which contain no heavy metal, has been described [this *Bulletin,* 1954, v. 51, 1064]. The present series of substances was synthesized in an attempt to obtain agents with suppressive and curative properties in amoebiasis. Four distinct types were prepared including alkylene diamines, xylylenediamines, phenylenediamines and bis(aminomethylcyclohexanes. The *in vitro* procedures followed were those described [*ibid.,* 1950, v. 47, 243] in which various strains of *Entamoeba histolytica* of human origin were used. Emetine was used as control drug. For *in vivo* tests young hamsters 100–120 gm. weight were used which harboured natural amoebic infections. Drugs were dissolved or suspended in gelatin and used at 3 dosage levels

twice daily for 4 days. On the day after the last dose the animals were killed and their caeca examined for infection.

Results indicated that *in vitro* all the substances tested were more active than emetine (effective at 1:7500 dilution) and proved effective at a dilution of 1:100,000 to 1:40 million; N,N′-bis-(dichloroacetyl) N N′-diethyl-1:6-hexamethylene diamine was effective at 1:40 million and this substance also proved active *in vivo*. Relation of activity in general to structure is discussed but cannot be readily summarized. The authors concluded that the new series of compounds presented a significant degree of activity *in vivo* in hamsters and similar results have been obtained in some cases in man.

J. D. Fulton

ZAMAN, V. **An Electron-Microscopic Observation of the "Tail" End of** *Entamoeba invadens*. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1961, May, v. 55, No. 3, 263–4, 2 figs. on pl.

RELAPSING FEVER AND OTHER SPIROCHAETOSES

ZUMPT, F. & ORGAN, D. **Strains of Spirochaetes isolated from** *Ornithodoros zumpti* **Heisch & Guggisberg, and from Wild Rats in the Cape Province. A Preliminary Note.** *South African J. Lab. & Clin. Med.* 1961, Mar., v. 7, No. 1, 31–5, 3 figs.

The authors have isolated a new strain of relapsing fever spirochaetes from ticks—*Ornithodoros zumpti*—collected from the nest of a Saunders vlei rat, *Otomys saundersiae* at Uitenhage, Cape Province. The white mouse and the multimammate rat, *Rattus natalensis*, were found to be highly susceptible to this spirochaete; 1 rabbit out of 3 inoculated showed a slight infection; but the vervet monkey, *Cercopithecus aethiops*, and guineapigs seemed to be refractory. The strain proved to be neurotropic, in this respect resembling *Borrelia duttoni*, but attempts to infect *Ornithodoros moubata* gave only negative results. Complement-fixation tests indicated a further difference between this new strain and *B. duttoni* and it is considered to be a new species for which the name *Borrelia tillae* is proposed.

As a result of further surveys a second strain of this spirochaete was isolated from another batch of *O. zumpti*, collected from an *Otomys* nest at Uitenhage, and 6 other strains were isolated from the brains of the four-striped rat, *Rhabdomys pumilio*, and the multimammate rat in the same district. These strains are assumed to be *B. tillae* and it is considered probable that *O. zumpti* is the normal arthropod reservoir and the infection is transmitted to some of its rodent hosts.

Edward Hindle

EIDMANN, E., POESPODIHARDJO, S. & VINKE, W. Der Nachweis komplementbindender Antikörper bei Infektionen mit Borrelien. [**Observations on Complement-Fixing Antibodies in *Borrelia* Infections**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1959, Dec., v. 10, No. 4, 442–7, 1 fig. [12 refs.]

Antigens were prepared from homogenized *Borrelia erratici* collected from rats infected with an original mouse strain [this *Bulletin,* 1960, v. 57, 478] at the height of infection and from infected chick embryo. Standard immune serum was obtained from rabbits injected intravenously twice weekly with antigen prepared from fresh suspensions of *Borrelia* sediment in saline. The antigens were checked by block testing against the immune serum and normal rabbit serum. Before being tested experimentally the antigens were further extracted with ether to remove a lipoid component apparently responsible for the non-specific reaction. Both antigens were heat-stable, and represented 40 antigen units in the undiluted state.

Sera were obtained from mice infected with *Borrelia* in the log phase, the stationary phase, the crisis and at weekly intervals thereafter up to 6 weeks. They were tested against the antigens diluted 1 in 10 to 1 in 80. Two days after the crisis the titre was only 1 in 10 and the first and second weeks after the first spirochaetal septicaemia it reached 1 in 20. All other titres were less than 1 in 10.

Human serum was obtained as a result of a laboratory infection which was treated 4 days after the first appearance of fever and which did not relapse. When tested against the antigens all sera were negative.

The production of complement-fixing antibodies in the rabbit was examined after injection of the rat blood antigen. Titres of 1 in 40 were reached in the third week after immunization and fell thereafter to rise to the same level in the seventh week. The response, however, was poor.

The authors conclude that infection with *B. erratici* does not lead to the production of strong complement-fixing antibodies. The value of the complement-fixation test in the serological diagnosis of relapsing fever appears to be very limited. *B. G. Maegraith*

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

PIRINGER, W. A., PLATA, L. & MUVDI, F. Lepra in Kolumbien. [**Leprosy in Colombia**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1961, v. 12, No. 1, 49–67. [112 refs.]

This is rather a concentrated and detailed report on the historic aspects of leprosy in Colombia. It appears that the disease was originally introduced by the Spaniards in the 16th and 17th centuries and is still endemic in several districts.

In the census of 1960, 11,430 cases of leprosy were determined among the

total population of 14 million. Lepromatous leprosy is the most common (69·9%) while the tuberculoid form accounts for 13·6% and the indeterminate for 16·4%.

For the last 10 years DDS compounds have been used almost exclusively. The percentage of failures has been 4·5%. In addition, thiosemicarbazone, streptomycin sulphate and dihydrostreptomycin sulphate and also isoniazid have been prescribed. In lepra reaction corticosteroids and antimony tartrate have been used.

A large-scale programme has been undertaken to increase resistance to tuberculosis and possibly leprosy as well by continued oral treatment of contacts with BCG. Governmental control aims at reducing the number of leprosaria and at instituting ambulatory treatment in their place. Infected persons are persuaded to seek voluntary treatment in one of the dermatological field stations already in existence in Colombia. In this manner costly leprosy surveys of the whole population can be avoided. In the future these field stations will be equipped for treatment not only of leprosy sufferers, but also of others suffering from other dermatological diseases.

Philip Manson-Bahr

CHAUSSINAND, R., BOURCART, N. & DESTOMBES, P. Infection conjugale observée à Paris, due à un malade atteint de lèpre indeterminée prélépromateuse. [**Conjugal Infection observed in Paris due to a Patient suffering from Indeterminate Prelepromatous Leprosy**] *Internat. J. Leprosy.* Wash. 1960, Oct.–Dec., v. 28, No. 4, 410–16, 2 figs.

Familial infection with leprosy is very uncommon in France; indeed the authors have seen only 1 case since 1946, a young girl who was in very close contact with her father who suffered from very infectious leprosy.

The present case described is that of a young Negro man who suffered at first from a lesion of the leg and was classified as having indeterminate prelepromatous leprosy [this *Bulletin,* 1961, v. 58, 463]. This lesion contained many bacilli and globi and the lepromin reaction was negative. Six months later under sulphone treatment this lesion became swollen and ulcerated and then turned into a typical tuberculoid lesion, bacteriologically negative, the lepromin reaction becoming positive (3-plus). At the time when the lesion was bacteriologically positive the young man became engaged to and married a white nurse. Some 5 years later this young woman developed a slight erythematous lesion on the right temple which slowly increased for some 2 years before she consulted a physician. This was diagnosed as leprosy and showed epithelioid and giant cells. It however cleared up quickly under sulphone treatment.

Discussing this instance of infection transmitted by contact over a short period with a leprosy patient at first of indeterminate type, the authors hold as probable "that all human individuals possess, although in varying degrees, a certain latent immunogenic potentiality. The increase or the abolition of this capability of resistance to leprosy infection depends especially on the metabolic phenomena, proper to each individual, in which physiologic variations and the pathologic disturbances of the internal secretions play an important role. This immunogenic potentiality may equally be enhanced or

inhibited according to the intensity and the repetition, more or less widely spaced, of the aggression on the organism by the leprosy bacillus. . . . The authors believe that the evolution of leprosy does not depend on the absence of a hypothetic N factor (Rotberg), but rather on metabolic phenomena capable of depriving the organism of the faculty of reacting against the infection, either temporarily or definitively. The clinical and immunological study of leprosy indicates, indeed, that the immunogenic potentiality of the organism is not immutable. It may increase in strength during treatment, and notably in the course of the 'reactional tuberculoid transformation'; but it can also be abolished, as is shown by the lepromatous evolution observed in certain patients with tuberculoid leprosy". *Ernest Muir*

NISHIURA, M. **The Electron Microscopic Basis of the Pathology of Leprosy.** *Internat. J. Leprosy.* Wash. 1960, Oct.–Dec., v. 28, No. 4, 357–400, 6 text figs. & 18 figs. on 18 pls. [35 refs.]

Ultra-thin sectioning and electron microscopy have now made it possible to study *Mycobacterium leprae* and its host cells at a resolving power of 30Å, and the pathology of leprosy has to be re-established on a new morphology of lesions. The present study is based upon the examination of 29 biopsy specimens: 16 from lepromatous skin, 5 from tuberculoid skin "(2 reactional and 5 quiescent)" [this = 7], 4 lepromatous great auricular nerves, and 4 tuberculoid great auricular nerves. More than 1,000 electron micrographs were made. The ultramicroscopic appearances at magnifications between 4,750 and 40,000 × are illustrated in 18 page-size plates.

Under Features of Lepromatous Skin Lesions are considered the arrangement of bacilli in lepra cells and vascular endothelium, the varieties of opaque droplets and the cytoplasm of lepra cells, and it is concluded that the findings in the usual lepra cells suggest a dormant state of the defence activity inside these cells. "There seems to be a definite relationship between the degree of destruction of the bacillary cytoplasm of the bacilli and the quantity of the electron-transparent material around them; the more marked the destruction, the broader the electron-transparent zone." In contrast with this, in tuberculoid lesions bacilli were found in epithelioid cells, but these bacilli were fragmented and swollen with no electron-transparent zone around them, suggesting the suppression of their metabolic activity. In the reactional tuberculoid lesion the number of mitochondria is distinctly increased in the cytoplasm of the epithelioid cells and suggests a lively cytoplasmic response of these cells against the phagocytosed bacilli; when this response is too violent the epithelioid cells break down and their components are thrown out into the extracellular environment.

The differences between the lepra cell in the lepromatous lesion and the epithelioid cell in the tuberculoid lesion are shown in tabular form.

In lepromatous lesions, bacilli in the axon lie naked or embedded in electron-dense masses. When Wallerian degeneration of the nerve fibres takes place the lipoid material surrounding them together with the myelin sheath is digested in the Schwann cells, but the bacilli themselves resist this digestion, and remain in the cytoplasm of these cells (passive phagocytosis).

The question is discussed as to how the bacilli enter and pass up the

nerves centripetally. A hypothesis is propounded that it is the property of ganglion cells to ingest lepra bacilli into their cytoplasm, " stretching their long arms (axons) and catching the bacilli with their active hands—the growing tips of the regenerating axons. Seeing that nerve degeneration and regeneration are constantly taking place even in normal skin . . . there seem to be many opportunities for the regenerating axons to catch and engulf leprosy bacilli into their axoplasm during their migratory phase in the skin ". The migration of bacilli inside the axon must depend on the behaviour of the host cells (ganglion cells and their axons), as bacilli are unlikely to swim up-stream " like tadpoles ". If they are not carried away to a wider space of the axoplasm in the ganglion cell, they may disturb the circulation of the axoplasm and thus cause Wallerian degeneration of the peripheral part of the axon. It would thus appear that the " ganglion cells and axons seem to be the real lovers of *M. leprae,* which they appear to ingest recklessly. The behaviour of the Schwann cells seems to be a rather passive one, as they appear to receive bacilli from the axon which they are infolding in their cytoplasm ".

[This paper is one of considerable interest. It is clearly written, and in addition to the 18 plates contains 6 text figures which add considerably to its lucidity.]

[For an earlier study, see this *Bulletin*, 1958, v. 55, 1231.] *Ernest Muir*

Souza, R. Paula & Bechelli, L. M. Correlação entre as reações lepromínica e tuberculínica em crianças de 0 a 4 anos. [**Correlation between Lepromin and Tuberculin Reactions in Children of 0 to 4 Years of Age**] *Rev. Brasileira Leprologia.* S. Paulo. 1960, Dec., v. 28, No. 4, 203–10. [25 refs.] English summary.

The test consisted in injecting into 46 infants tuberculin in 1 in 1,000 and 1 in 100 dilutions and reading the results after 72 hours, an infiltration of 6 mm. or more being counted positive. The lepromin reaction was read after inoculation at 25 to 35 days, the reading being according to the rules of the Madrid Congress.

All the tuberculin-positive children were lepromin-positive, but there were lepromin-positive children (even 2–plus) who were tuberculin-negative. All the 27 children who were lepromin-negative were also tuberculin-negative ; but of these, 11 were converted to 1–plus positive on a second lepromin test ; 7 of these were retested with tuberculin but all remained negative. Thus, the conversion to lepromin-positive did not depend on co-sensitization with the tubercle bacillus. *Ernest Muir*

Cambiaghi, O. BCG oral e reação de Mitsuda em escolares. [**Oral BCG and the Reaction to the Mitsuda Test in Schoolchildren**] *Rev. Brasileira Leprologia.* S. Paulo. 1960, Dec., v. 28, No. 4, 211–20. [20 refs.]

BCG was administered to 149 children aged 5 to 13 years in 3 oral doses on 24 November, 1956, 13 February, 1957 and 14 March, 1957, the dose on each occasion being 0·20 gm. These children had not been in contact with

leprosy sufferers and their lepromin reactions were negative, doubtful or 1–plus. Retesting of the lepromin reaction 17 months after the last dose of BCG showed no increase of reactivity to lepromin. *Ernest Muir*

CONVIT, J., ARVELO, J. J. & MENDOZA, S. **Lepromatous Myositis.** *Internat. J. Leprosy.* Wash. 1960, Oct.–Dec., v. 28, No. 4, 417–22, 4 figs.

Mention of leprous lesions inside muscles is seldom made in the literature. The authors describe 4 patients in whom they found leprous nodules, deep inside the muscles, hard in texture and of size from a hazel nut to a walnut. These nodules tend to become larger and harder during lepra reaction. They lie between the muscle fibres which they push aside and sometimes fracture. Histologically the nodules are of lepromatous structure and are often found to contain very granular bacilli. It is indicated that leprous nodules are much more common than is supposed " and it is suggested that a search for nodules be made systematically by palpation of the muscles in routine control ".

Ernest Muir

LITALIEN, F., HARTER, P., TRINH-THI-KIM-MONG-DON & NGUYEN-THI-DANH. Détermination cutanée de la maladie de Hansen chez des lépreux névritiques purs sous l'influence du traitement sulfoné. [**Cutaneous Leprous Manifestations in Patients with Nerve Leprosy during Sulphone Treatment**] *Bull. Soc. Path. Exot.* 1960, Nov.–Dec., v. 53, No. 6, 943–8.

Purely neuritic leprosy is not rare, as is shown by one of the authors having collected 90 cases in Vietnam; but the clinical picture may be altered under sulphone treatment. Thus in 3 patients sulphone treatment was followed for the first time by the appearance of cutaneous lesions and in 2 others an increase in minimal lesions occurred. Probably there were pre-existing cutaneous lesions, and the effect of treatment was to bring them to light.

Ernest Muir

BASSET, A., CAMAIN, R., BASSET & SOW, A. M. Traitement des formes de début de la lèpre par le 7522 R.P. (Sultirène). Premiers résultats. [**Treatment of Early Forms of Leprosy with 7522 RP (Sultirene). First Results**] *Bull. Soc. Méd. Afrique Noire Langue Française.* Dakar. 1960, v. 5, No. 4, 461–5.

This drug [sulphamethopyrazine, Sultirene: this *Bulletin*, 1959, v. 56, 1146; 1961, v. 58, 211] was tested in the treatment of 20 patients with leprosy, 3 tablets of 250 mgm. each being given every second day. The patients suffered from different forms of leprosy, but all were in the early stage. Treatment lasted from 1 to 16 months. Short notes of each case are given.

The drug was well tolerated, and there was no change in the blood picture.

There were seldom reactions. In many cases there was clinical improvement from the first few weeks, and it was marked at the end of 6 months. In some borderline and tuberculoid patients, for example, there was rapid clinical and bacteriological healing. A lepromatous patient quoted showed disappearance of globi and the persistence of only few bacilli after 11 months' treatment.

7522 RP is considered better than DDS in that it does not provoke exacerbations or cause nerve pains. However, histopathological improvement is always slower than clinical as is the case in other treatment, and the duration of treatment is bound to be prolonged. *Ernest Muir*

HARTER, P., LITALIEN, F. & TRINH-THI-KIM-MONG-DON. Emploi d'une diphényl-thiourée (4-butoxy-4′-diméthyl-amino-thiocarbanilide ou summit-1906) dans certaines variétés de lèpres. [**The Use of Diphenyl-thiourea (4-butoxy-4′-dimethyl-aminothiocarbanilide or Summit-1906) in Certain Varieties of Leprosy**] *Bull. Soc. Path. Exot.* 1960, Nov.–Dec., v. 53, No. 6. 950–60. [14 refs.]

A study of this drug was made in 23 Chinese and Vietnam patients suffering from leprosy. Of the lepromatous patients 8 had had no previous treatment. 7 had had previous treatment with sulphones and had suffered from severe erythema nodosum leprosum and relapses, and 2 others were strongly bacteriologically positive in spite of many years of treatment. Su-1906 was given in doses rising to 2 or 4 gm. per day, according to the body weight. A tuberculoid patient lost all signs in 5 months; the 5 borderline patients responded in a variable manner; in the patients with lepromatous leprosy, the drug was sometimes effective where sulphones had failed. The more rapid action of Su-1906, at least in the first few months, as reported by previous workers, is confirmed [this *Bulletin,* 1960, v. 57, 41], but the authors caution that "it must be handled as carefully as the other antileprotic remedies". The results are tabulated and discussed. *Ernest Muir*

OPROMOLLA, D. V. A. & QUAGLIATO, R. A "Serociclina" na lepra. Observação em 32 casos. [**Cycloserine in Leprosy. Observations on 32 Cases**] *Rev. Brasileira Leprologia.* S. Paulo. 1960, Dec., v. 28, No. 4, 185–202, 16 figs. [25 refs.] English summary.

Cycloserine combined with isoniazid was tested in the treatment of 32 patients divided into 2 groups. In Group A there were 14 patients who had had sulphone treatment previously up to 18 months. In Group B the 18 patients had had no antileprosy treatment previously. The dosage was 250 mgm. of cycloserine and 150 mgm. of isoniazid twice a day for adults.

In Group A, after treatment up to 12 months, 42·8% showed improvement. In Group B, after similar periods of treatment, 55% showed improvement. In many patients there was reaction occurring about 5 days after treatment was begun. Full clinical notes are given [see also this *Bulletin*, 1961, v. 58, 212, 465]. *Ernest Muir*

MUKERJEE, N. & GHOSH, S. **Trial of Isonicotinylhydrazone of 2-Carboxymethoxybenzaldehyde (Compound 377) in the Treatment of Leprosy. Preliminary Report.** *Internat. J. Leprosy*. Wash. 1960, Oct.–Dec., v. 28, No. 4, 408–9.

Compound 377 has been shown to hold rat leprosy in check for as long as 15 months [this *Bulletin*, 1958, v. 55, 529] and the authors, from the School of Tropical Medicine, Calcutta, have therefore tried it for a period of 15 months in 8 patients with active, generalized lepromatous leprosy who had had no previous antileprosy treatment. They were given initially 25 mgm. by mouth in divided doses daily and this was later increased to 200 mgm. daily for 6 days a week.

The results are tabulated. Clinical improvement was well marked, nodules and patches subsided and flattened and infiltrations also subsided. In one patient, a trophic ulcer healed completely. Anaesthesia, present in a few patients, was not altered. There was much bacteriological improvement, but no patient became negative. "The patients were so satisfied that they believed the disease to be cured; they looked like normal persons." No toxic manifestations were observed clinically or in examinations of the blood and urine.

This short trial suggests that the drug is effective in human leprosy.

H. J. O'D. Burke-Gaffney

O'BYRNE, A. **Antithyroid Substances in the Treatment of Leprosy.** *Internat. J. Leprosy*. Wash. 1960, Oct.–Dec., v. 28, No. 4, 401–7, 8 coloured figs. on pl.

In 1952 the author treated a patient suffering simultaneously from leprosy and thyrotoxicosis with propylthiouracil. After 6 months both conditions showed much clinical improvement, the patient becoming bacteriologically negative. Between 1953 and 1958 he treated 69 leprosy patients with antithyroid drugs including propylthiouracil and Tapazole [methimazole] (1–methyl–2–mercaptoimidazole), administering them as adjuvants to sulphones. Of these, 42 showed satisfactory control of the disease. After 1958 antithyroid drugs were used as the basic treatment for leprosy, and by May 1960 they had been used in a total of 236 cases.

As Tapazole is said to be about 10 times as potent as propylthiouracil in antithyroid activity, the author has continued to treat most new leprosy patients with the former drug alone. He gives details of the history and treatment of 4 of these patients, illustrating the results with colour photographs before and after treatment. The dosage of Tapazole given varied from 1 to 6 (5 mgm. each) tablets daily. Remarkable clinical and bacteriological results are claimed in comparatively short periods.

In the discussion, certain geographical and biological comparisons are pointed out between leprosy and thyrotoxicosis, and it is concluded that the clinical signs of leprosy "are merely an outward sign of a hidden underlying constitutional disturbance with many ramifications".

[At least a case seems to have been made for a full-scale controlled trial of this drug.] *Ernest Muir*

MARTINS, M. G., Jr. Contribuição da cirurgia plástica para a reabilitação dos doentes de lepra. [**Observations on Plastic Surgery in the Rehabilitation of Leprosy Patients**] *Rev. Brasileira Leprologia.* S. Paulo. 1960, Dec., v. 28, No. 4, 221–8, 24 figs. [15 refs.] English summary (9 lines).

HELMINTHIASIS

*In this section abstracts are arranged as far as possible in the following order:—*TREMATODES *(schistosomes, other flukes);* CESTODES *(Diphyllobothrium, Taenia, Echinococcus, other cestodes);* NEMATODES *(hookworms, Ascaris, filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.).*

GALLIARD, H. Hormones corticotropes et cortico-surrénales dans les infections à helminthes. [**Corticosteroids in Helminthic Infections**] *J. Helminthology.* 1961, Suppl., 93–100. [17 refs.]

PITCHFORD, R. J. **Observations on a Possible Hybrid between the Two Schistosomes** *S. haematobium* **and** *S. mattheei. Trans. Roy. Soc. Trop. Med. & Hyg.* 1961, Jan., v. 55, No. 1, 44–51, 9 figs.

"A young native girl about 12 years old from Komatipoort, was found discharging numerous *S. mattheei* and *S. haematobium* ova regularly in her urine. The *S. mattheei* ova were separated and laboratory-bred *Bulinus* (*Physopsis*) sp. from Komatipoort exposed to the miracidia. White mice and *Mastomys natalensis* were subsequently infected." The worms and eggs obtained were identical and similar transmissions from other human sources (with *S. mattheei*) yielded identical adults and eggs in the first generation. The strain from the girl was transmitted to various rodents through 4 generations, to a sheep in the second and to a calf in the fourth generation. Eggs obtained in the first and third generations were not typical of either *S. mattheei* or *S. haematobium,* yet their morphology was constant, as demonstrated by measurements and camera lucida drawings. They were longer than eggs of *S. haematobium* and shorter than those of *S. mattheei.* The eggs obtained from the second generation were identical with those of *S. mattheei* but shorter, while in the fourth generation (in 4 species of rodents and one calf) numerous eggs were obtained which varied in morphology from *S. haematobium* to *S. mattheei,* with all intermediate forms.

In discussing the significance of these findings the author first stresses the morphological and biological differences between *S. haematobium* and *S. mattheei*: (a) their eggs are different, (b) *S. haematobium* is definitive—host-specific for man only, whereas *S. mattheei* is found as a natural infection

in various hosts—cattle, sheep, goats, man, rodents (3 spp.) and impala (it has recently been found in blue wildebeest and one zebra, which are new records in South Africa), (c) *S. mattheei* when passaged in laboratory animals breeds true; moreover it is easily transmissible to rodents whereas *S. haematobium* is not. The original "*S. mattheei*-like" eggs from the Komatipoort girl thus may have been one of three things. (1) Malformed *S. haematobium* eggs: the author rejects this possibility on biological grounds [mentioned above] and on the same basis rejects the possibility that *S. haematobium* and *S. mattheei* are not separate species. (2) Pure *S. mattheei* eggs: this is rejected on experimental evidence that *S. mattheei* breeds true and does not produce *haematobium*-like eggs or intermediate forms which are distinguishable from both species. (3) Eggs of hybrids between *S. mattheei* and *S. haematobium*: although this is not proved experimentally, *e.g.*, by actual crossing of males of one species with females of the other, the evidence is strongly in favour of the hybridization theory.

"From these and other observations it appears that the cattle schistosome *S. mattheei* will infect man, but that man is not a particularly good host; if he were, there seems no reason why the incidence of *S. mattheei* in man should not be as high as that of *S. haematobium* in those areas where there is close association between the two definitive hosts . . .

"The problem is obviously still in its infancy but with the increased tendency to congregate natives into villages in the reserves, with the resultant increased use of the same water supply by man and cattle, there is every likelihood that the incidence of *S. mattheei* in man might increase. The resulting hybrids will in time possibly supplant *S. mattheei* and *S. haematobium* with a schistosome infecting man and cattle with equal ease." *J. J. C. Buckley*

STRONG, J. P., MCGILL, H. C., Jr. & MILLER, J. H. **Schistosomiasis mansoni in the Kenya Baboon.** *Amer. J. Trop. Med. & Hyg.* 1961, Jan., v. 10, No. 1, 25–32, 4 figs. [32 refs.]

"One hundred and fifty baboons from Kenya, British East Africa, had a high prevalence of infection with *Schistosoma mansoni*, indicating that the baboon may be an important reservoir host for this parasite.

"The distribution of *S. mansoni* eggs in the tissues of the baboons is similar to that found in mild human infections and the pathogenesis of lesions in the colon and liver is also similar. Hepatic cirrhosis, however, was not observed in the baboon.

"These studies, which point out many similarities between human and baboon infections, confirm Newsome's suggestion [this *Bulletin*, 1956, v. 53, 1441] that the baboon is an excellent experimental animal for research in schistosomiasis. The baboon is superior in many ways to the common laboratory animals and also to other primates.

"Measures to control human schistosomiasis should take into account the possibility that the baboon is an important reservoir host. Other primates should be examined in areas where human schistosomiasis exists to determine their role in host-parasite relationships."

[See also *ibid.*, 1961, v. 58, 221.]

ODEI, M. A. **A Review of the Distribution and Snail Hosts of Bilharziasis in West Africa. Part I. Gambia, Ghana, Sierra Leone, Nigeria, and British Cameroons.** *J. Trop. Med. & Hyg.* 1961, Feb., v. 64, No. 2, 27–41, 5 maps. [Numerous refs.]

In introducing the first of these reviews the author describes the role of the two causal organisms, *Schistosoma mansoni* and *S. haematobium*, in West Africa and indicates the system of snail nomenclature he intends to follow. "The purpose of this review is to summarize what is known of the endemicity and infection rates and, where possible, the mortality and morbidity rates due to bilharziasis in West African territories.

"In each territory the snail intermediate hosts, both proven and potential, of the human pathogenic schistosomes have been indicated."

Gambia

S. haematobium is widespread in the eastern half, while the centre and western half is almost free; but at Kartung on the coast a survey revealed 91% infection (by urine examination) in subjects aged 11–20 years. At least 5 species of potential intermediate hosts are known, *Bulinus senegalensis*, *B. jousseaumei*, *B. guernei*, *B. globosus* and *B. forskali*. *S. mansoni* is present but is endemic in few places, mainly in the western extremity. The intermediate host is *Biomphalaria pfeifferi gaudi*.

Sierra Leone

S. haematobium is widely distributed in the Central and Northern Provinces, but chiefly in their eastern regions. It affects a large proportion of the population. It is not endemic in the south. *S. mansoni* and *S. haematobium* co-exist in Kabala, to the north-east. *Bulinus* (*P.*) *globosus* is the intermediary of *S. haematobium*; *Bulinus forskali* has not been found infected. *Biomphalaria pfeifferi* is the intermediary of *S. mansoni* in Sierra Leone.

Ghana

Schistosomiasis is widespread in Ghana, *S. haematobium* being much more common than *S. mansoni*. *S. haematobium* is present in two large areas, one in the central region of Southern Ghana and West Ashanti, the other in north-eastern and north-western Northern Ghana and the southern Volta Region. The distribution of *S. mansoni* is not well known. The intermediate hosts of *S. haematobium* are *Bulinus globosus* and more rarely and locally only, *B. truncatus rohlfsi*. *B. forskali* is widespread but is apparently refractory in Ghana. *Biomphalaria pfeifferi gaudi* is present wherever *S. mansoni* occurs, but there is some doubt as to whether this infection is endemic or not. It is stressed that much remains to be done and should be investigated in regard to the endemicity in view of the development projects which are rapidly proceeding.

Nigeria

Most of the work on schistosomiasis has been confined to the Northern Region. From intradermal tests in various localities and on troops in 1934 it was calculated that 68% (of 5,482) people were infected in this region,

varying from 25% to 88%. Urine and stool examinations in the same region confirmed that the diseases were endemic or hyperendemic in N. Nigeria. *S. haematobium* is more common than *S. mansoni* and double infections were not uncommon. Experimental work indicates that *B. pfeifferi* is the principal if not the only intermediate host of *S. mansoni* and it appears to be fairly widely distributed. *B. globosus* has been shown experimentally to be an intermediate host of *S. haematobium* in Nigeria ; *B. tchadiensis* and *B. angolensis* have also been suggested. Experimental infections of snails indicate that more than one " strain " of *S. haematobium* exists in Nigeria. The role of *B. forskali* is unknown.

S. intercalatum has been reported from persons in Nigeria (and French Cameroons) as a result of the finding of *intercalatum*-like eggs.

British Cameroons

There are two main foci, one in the north near Lake Chad (*S. haemotobium* only) and the other in the south in two places, Lakes Mbo and Kotto respectively (*S. haematobium* only), where the incidence is 91% and 76% respectively. *Biomphalaria* occurs in both the northern and southern foci ; *Bulinus africanus* and *B. forskali* are abundant in the north. *B. forskali*, *B. truncatus rohlfsi* and *B. camerunensis* have been recorded in the south.

In Southern Cameroons fisherfolk have the highest infection rates. Cultivation of rice in this region may favour an increase in the disease and movements of infected persons may favour its spread. Opinions differ as to its seriousness. In the North, the authorities " seem well equipped to prevent any outbreak of the disease that may result from the extensive irrigation scheme ".

J. J. C. Buckley

ODEI, M. A. **A Review of the Distribution and Snail Hosts of Bilharziasis in West Africa. Part II. French Guinea, Ivory Coast, Senegal, Togo and Dahomey, the Niger, Haute Volta and the Soudan.** *J. Trop. Med. & Hyg.* 1961, Mar., v. 64, No. 3, 64–8, 1 map. [19 refs.]

French Guinea

Schistosomiasis in both the vesical and intestinal forms has existed in Guinea for a long time. A survey in 1930 revealed a 68% incidence in a village close to the Sierra Leone border. The snail intermediaries are *Bulinus globosus* and *Biomphalaria pfeifferi* respectively.

Ivory Coast

Both forms of the disease are known to occur but information regarding them is meagre. Records of snails are as follows:— *Physopsis africana* [*Bulinus africanus*], *Bulinus strigosus*, *B. globosus*, *B. dybowskii*, *Planorbis* [*Biomphalaria*] *adowensis*, *Biomphalaria* sp. and *Bulinus truncatus rohlfsi*. *B. forskali* was found frequently in certain lagoons, calm bays, borrow-pits and other temporary waters.

Senegal

Schistosoma haematobium was first recorded in 1905; subsequent surveys indicate that it has a patchy distribution but its true extent needs investigation. *S. mansoni* is also present; according to one worker there is only one known focus of this infection.

Intermediate hosts have not been determined but the following species of snails have been recorded:— *Bulinus contortus*, *B. strigosus*, *B. forskali* (*sensu lato*), *B. senegalensis*, *B. guernei*, *B. jousseaumei* (= *B. trigonus*?) and *Biomphalaria pfeifferi gaudi*.

Togo and Dahomey

Schistosomiasis is prevalent in both territories but information is limited, especially in regard to Dahomey. One estimate places 5% of the population of Togo with *S. haematobium* and 0·5% with *S. mansoni*. In three areas surveyed, schoolchildren had incidences of 30·7%, 31% and 44·7% respectively. One report states "that transmission appears to take place in all the ten districts [of Togo], but that there appear to be two areas with relatively higher prevalence. One of these is in the Southern part of the country".

Biomphalaria spp. and *S. mansoni* are found only in the northern part of the country. In both Dahomey and Togo the following species have been found:— *Physopsis africana* [*B. africanus*], *Bulinus dybowskii* and *Planorbis* [*Biomphalaria*] *adowensis*. *B. forskali* has been reported from Dahomey.

Laka Togo is not a habitat for snails as it is too salty, and according to one authority many of the main streams and rivers are free from intermediate hosts. "Also many of the bodies of water that dry up during the dry seasons apparently do not serve as transmission sites." The snails occur in slow-moving streams, marshes, ponds, borrow-pits and intermittent streams.

The Niger, Upper Volta and Sudan [*formerly French*]

"Marill (1957) [this *Bulletin*, 1957, v. 54, 1424] who worked in the Haute-Volta (Upper Volta) remarked that it is no longer justifiable to refer to foci of bilharziasis in this area since it is becoming clear that the whole of the Voltaic plateaux, from the Niger to the Soudan, form a vast area of endemicity of bilharziasis within which there exist certain localities each with an exceptionally high incidence of infection." Both vesical and intestinal forms of the disease occur, the former being more prevalent and less serious than the latter, as in the other countries so far mentioned.

Physopsis africana [*B. africanus*] and *Bulinus tchadensis* have been infected experimentally with *S. haematobium* in Sudan and *Bulinus tchadensis* and *B. strigosus* have been incriminated in all three territories. *Pyrgophysa dautzenbergi* and *B. forskali* have been suspected as carriers. *B. jousseaumei* has been recorded from Sudan. *Planorbis* [*Biomphalaria*] *adowensis* is suspected as a host of *S. mansoni*. The author comments on the report that *Physopsis africana* [*B. africanus*] can be readily infected with *S. mansoni* and remarks that this ability is very surprising [which is putting it rather mildly!].

This paper contains a useful map of West Africa indicating the French-speaking territories and the places therein which are mentioned in the text.

J. J. C. Buckley

ODEI, M. A. **A Review of the Distribution and Snail Hosts of Bilharziasis in West Africa. Part III. Liberia and Portuguese Guinea.** *J. Trop. Med. & Hyg.* 1961, Apr., v. 64, No. 4, 88–97, 2 maps & 1 fig. [27 refs.]

Liberia

A survey of 3,429 labourers at a mine in Bomi Hills in the Western Province, who were recruited from various parts of Liberia and hence were taken as a representative sample, revealed *Schistosoma haematobium* eggs at a rate of over 50% in groups from the upper part of the Central Province. This was the highest rate found. Groups of people from the coastal half of the territory and also from the whole of the Eastern Province and much of the Western Province were free from infection. In Upper Central Province a previous survey in a leprosy colony revealed 16% positive for *S. haematobium* eggs in urine and 2% positive for *S. mansoni* eggs in stools. The infection rate with *S. haematobium* in the lower half of the Central Province never exceeded 10%: some of these patients had probably acquired infection elsewhere.

Biomphalaria pfeifferi transmits *S. mansoni* in Liberia; *B. pfeifferi gaudi* also occurs, at Suakoko. *Bulinus globosus* transmits *S. haematobium* in this territory.

Portuguese Guinea

"Intestinal bilharziasis caused by *S. mansoni* is apparently non-existent in Portuguese Guinea." However, the known intermediate host, *Biomphalaria pfeifferi gaudi*, occurs, so that there is a risk of *S. mansoni* being introduced.

S. haematobium has been reported only from the northern region and is localized in the river basin systems, Cachev, Caiomete, Geba and Corubal, where the incidence in children was reported as 13%, 54%, 34% and 18% respectively. Women are more often infected than men and the nomadic Peuĺ tribe have a lower incidence than the more settled Mandingas and Manjacas.

Bulinus forskali occurs but was not found infected with *S. haematobium*; *B. africanus* is an experimentally proven vector in this territory; but the identification of this snail is open to doubt and it may really be *B. globosus*. Also reported are *B. jousseaumei* and *B. senegalensis*.

The absence of schistosomiasis in the coastal region is evidently due to tidal action (salinity), agricultural practices and the long dry season. Taking the country as a whole, "Bilharziasis, in this territory, for the time being does not appear to present a problem and morbidity is low."

The author concludes this paper with some general remarks on the anatomy of African Planorbidae and tabulates the species of snails in each territory, which are proven, or suspected hosts. "It must be admitted that the identification of most of these snails is very doubtful, especially when it is noticed that snail species known to be peculiar to East and Central Africa are included with species from West Africa, *e.g.*, *Bulinus strigosus*, *B. trigonus*, *B. contortus*, *B. dybowskii* and *B. angolensis*." Photographs of the shell of each of the species of *Bulinus* known to be vectors of *S. haematobium* (and of one

suspect) show the specific differences which are amplified in the text. There is also a photograph of *Biomphalaria pfeifferi gaudi*.

In a general discussion the author comments on the varying incidence and intensity of the disease in different parts of West Africa; the possibility of its spread and the factors involved in this possibility; the problem of control and prevention; the *B. forskali* problem and the incomplete knowledge of the susceptibility of all the species of snails which are present, and the increasing appreciation of the possible importance of animal reservoirs of the schistosomes of man. *J. J. C. Buckley*

WRIGHT, C. A. **A Note on the Distribution of** *Bulinus senegalensis*. *West African Med. J.* 1959, Aug., v. 8 (n.s.), No. 4, 142–8, 1 fig. & 1 pl. [19 refs.]

Bulinus senegalensis is an important vector of *Schistosoma haematobium* in the Gambia [SMITHERS, this *Bulletin*, 1956, v. 53, 1438] and has a limited known distribution, unlike its close relative *B. forskali*. Established records place it within the boundaries of the Sudanese Province of the zoogeographical map of the Ethiopia region. If this is a limitation in fact, the author points out, it is the only bulinid snail which is so confined, and he thinks it likely that there are hitherto undetected populations of *B. senegalensis* elsewhere, which may be of epidemiological importance. The difficulty of detecting these snails, apart from the nomenclatural one, lies in their choice of habitat, namely, laterite pools which depend on rainfall for their existence and hence are non-existent during the dry season.

"The evidence so far gathered indicates that no attempts to control urinary schistosomiasis in the region indicated on the map [*i.e.*, the known distribution of *B. senegalensis*] should be undertaken without first making certain that there are no foci of *B. senegalensis* in the immediate area of the control scheme." *J. J. C. Buckley*

EL-GINDY, M. S. **On the Variability in Morphology and Anatomy of the Planorbid Snails in Egypt (U.A.R.) with special reference to Snail Intermediate Hosts of** *Schistosoma mansoni*. *J. Egyptian Med. Ass.* 1960, v. 43, No. 11, 816–35, 4 figs.

The intermediate host of *Schistosoma mansoni* in Egypt (*Biomphalaria alexandrina*) has been the object of several earlier studies and there has been some conflict of opinion about the details of the anatomical structure. El-Gindy has examined a large number of specimens of this species and has shown that there are 5 regionally distinct forms which differ slightly in shell structure, genital anatomy and characters of the radula teeth. He also describes briefly the principal anatomical characters of 2 other species of Egyptian planorbid snails which bear a superficial resemblance to *Biomphalaria*, *Planorbis philippi* and *Gyraulus mareoticus*. *C. A. Wright*

Le Golvan, P. C.; Ishak, K. G.; Salib, M.; Sabour, M.; Nooman, Z. **Needle Biopsy of the Liver, Experience in 363 Biopsies. II. Histopathological Method of Examination and System of Recording Data** [Le Golvan, Ishak, Salib, Sabour & Nooman]. *J. Egyptian Med. Ass.* 1958, v. 41, Nos. 11/12, 582–8, 21 figs. on 4 pls. **III. Clinical Evaluation of the Procedure** [Salib, Sabour, Nooman, Ishak & Le Golvan]. *Ibid.*, 1959, v. 42, No. 1, 9–13.

i. Needle biopsy specimens of liver were fixed in 10% formalin, embedded in paraffin, sectioned and variously stained. The slides were reported on by 2 pathologists who were ignorant of the patients' histories; their reports were made on standard forms listing in great detail the presence or absence of abnormalities in the various liver structures. This systematic histopathological report on liver biopsy material has proved valuable. Some photomicrographs illustrating the various findings are appended [unfortunately reproduction on the paper used is so poor as to negate their value].

ii. In 182 specimens of the 362 liver biopsies performed it was anticipated from the clinical picture that there would be evidence of schistosomal involvement. 16 (8·8%) of these specimens did not contain firm liver tissue but the other 166 were satisfactory samplings; in these 166 specimens examination verified the diagnosis in 116 (70%); in the remainder it indicated that the liver fibrosis was of other origin. The biopsy technique was comparably helpful in the diagnosis of portal cirrhosis (16 cases), malignant disease (27), and a number of other conditions with liver involvement; it was found that 84% of the successfully taken biopsies gave information of significant diagnostic value. *A. R. D. Adams*

Khairy, M. **Bleeding Oesophageal Varices in Bilharzial Hepatic Fibrosis.** *J. Egyptian Med. Ass.* 1960, v. 43, No. 10, 790–803, 7 figs. [11 refs.]

In the late stages of schistosomiasis in Egypt hepatic fibrosis and portal obstruction often lead to oesophageal varices which bleed severely and endanger life. The generally accepted operative treatment for this complication of hepatic cirrhosis is unsatisfactory in schistosomiasis. These subjects are usually in a very poor state of health and nutrition. The author has studied the disease in a number of these patients and suggests a simple operation to control the bleeding.

He studied 77 cases of schistosomal hepatic fibrosis and found that about 40% of the patients had oesophageal varices and about 23% presented with haematemesis. At operation on 72 of these patients, the free and occluded portal venous pressure was measured directly by manometry and the results correlated with the operative findings. He divides these into 4 stages of increasing severity: (a) splenomegaly but no ascites or varices, (b) splenomegaly with varices but with no history of bleeding, (c) ascites present in addition, (d) varices that have bled. In all 4 stages the portal pressure is raised and is progressively higher from (a) to (d). The difference between free and occluded pressure is about the same in (a) and (b) but less in (c) and markedly lowered in (d). He considers that the tendency for these patients to bleed depends more upon the degree of hepatic fibrosis (as indicated by

the approximation of free and occluded portal pressure) than upon the absolute rise in portal pressure.

In treatment the author considers that the use of the balloon properly applied is satisfactory during the actual haemorrhage. He thinks that the major operations such as gastric transection, shunt operations, splenectomy and ligation of veins (the most important being one running from the fundus along the posterior wall of the lesser sac to join the splenic vein) are all likely to be too severe for these patients. He therefore treated 12 of his series by left phrenic nerve avulsion. The rationale of this is that this nerve innervates the left crus of the diaphragm and forms the left limb of the oesophageal hiatus, which is the limb mainly responsible for the functional control of the cardiac orifice. He argues that the continual movement of this limb constricts the oesophageal varices here and increases the liability to haemorrhage. After a follow-up of 2 to 15 months it was found that 9 patients (75%) had no recurrence of bleeding and that 2 had further haemorrhage, while one patient with a massive ascites at the time of operation died with respiratory embarrassment. *J. R. Rose*

J. Egyptian Med. Ass. 1960, v. 43, No. 10, 659–771, 2 charts. [Numerous refs.] **Treatment of Schistosomiasis, Past and Present.**

The following papers were submitted to the Schistosomiasis Conference held in Cairo in February 1960.

Firstly H. F. Nagaty and M. A. Rifaat give an account of the *Treatment of Schistosomiasis, Past and Present* (pp. 659–707). Their paper is divided into three parts. Part I is a historical review of the use of antimony in the treatment of schistosomiasis. After some introductory information on the incidence, distribution and consequences to the community of the schistosomiases of man, it recounts the uses to which antimony has been put medicinally since the earliest known records, paying particular attention to its employment in various forms for the treatment of schistosomiasis.

Part II records the authors' own clinical investigations into the treatment of urinary and intestinal schistosomiasis with TWSb (antimony dimercaptosuccinate). This is an account of its use on 45 (39 male) Egyptian hospital patients suffering from one or other, or from both, forms of Egyptian schistosomiasis. Studies of kidney function and some other investigations were undertaken on these patients. The TWSb was given intravenously or intramuscularly once daily for 5 days (20 patients), or daily for two 3-day periods with an interval of 7–10 days (25 patients). Each dose was 3 or 4 ml. of a 10% solution of the drug, according to the weight of the patient, the aim being 5–10 mgm./kgm. of body weight (a total of about 0·5 gm. TWSb). Vomiting followed each injection within 2–3 hours in most (84·5%) cases; sometimes it was severe and lasted a couple of hours. Its delayed onset the authors believe to be due to splitting of the antimony from the mercaptosuccinate radical. Other lesser toxic side effects were headache, skin eruptions, oedema of the face, pain at the injection site, joint and muscle pains and abdominal pains. The pulse rate usually rose; electrocardiographic tracings made from some patients showed changes similar to those produced by other antimonials.

All the 45 patients treated with TWSb ceased to pass ova within 29 days; viable eggs had vanished within 2 weeks. Another group of 61 patients were treated with TWSb; 51 had the same dosages as the preceding; 10 had only 3 injections. All but 5 of the last were followed-up and all were found to have ceased passing ova.

The authors find that these short treatments with TWSb give as good results as does the intensive treatment with tartar emetic recommended by ALVES and BLAIR [this *Bulletin*, 1946, v. 43, 344], and that they are much less toxic than is the latter.

Part III reports synergism between antimony (tartar emetic) and thioxanthone compounds in the treatment of schistosomiasis (urinary). The substance of this paper has already been published [*ibid.*, 1961, v. 58, 219].

M. SAIF in *Oral Therapy of Schistosomiasis* (pp. 708–716) gives a brief account of efforts to cure schistosomiasis by this means. Preparations tried at various times include male fern, quinine and buchu, thymobenzol, hexamine, carbon tetrachloride, tartar emetic and other antimonial compounds, and preparations of tin. Eventually the thioxanthones emerged as drugs of some value for the purpose but their toxicity has proved a drawback. Yet further compounds of dubious efficacy have recently appeared and lately have been succeeded by a series of *p*-aminophenoxy alkane compounds which show some promise and are still under study.

M. S. EL-GINDY in a contribution on *Scientific Aspects in the Control of Snail Vectors of Bilharziasis* (pp. 717–736) details briefly some physical, biological and chemical means of control of certain snail vectors of the infection. This paper should be consulted in the original by those interested; appended to it is a lengthy and useful bibliography.

A. H. MOUSA, A. EL-GAREM and E. H. EL-RAZEKKI studied *The Effect of Chlorothiazide on Portal Pressure in Normotensive and Hypertensive Cases of Hepato-Splenic Bilharziasis* (pp. 737–745). 15 patients were under survey and the drug was given to them orally in doses of 1,000 mgm. daily for 10 days. In 9 of 13 cases of hypertension the splenic pressure thereby was reduced to normal and in 2 it was partially reduced; the splenic pressures in the 2 normotensive patients were unaffected. The diuretic responses to the drug were good in all patients except in the only one who had ascites.

A.-H. A. ATA and A. H. MOUSA in their study of the *Treatment of Bilharziasis by the Slow Method* (pp. 746–761) gave Fouadin to 100 patients and tartar emetic to 65, both drugs being given once weekly for up to 25 injections. They report the cure rates to be as high as those obtained with conventional treatments and the course to be very well tolerated; especially they considered that it lessens "the danger of disseminating the ova or worms to the viscera . . ." and thereby minimizes the pathological lesions resultant on their lodgement in the liver and elsewhere. A minimum of 10 injections is necessary to achieve the results they claim, which include both effective therapy and successful chemoprophylaxis of those constantly at risk of reinfection

T. S. NASR has examined *Sodium Pentachlorophenate as a Molluscicide under Egyptian Conditions* (pp. 762–771) and considers that in spite of its considerable molluscicidal properties and persistence it would not prove effective in the absence of prevention of reinfestation with snails of the treated areas. The irrigation system of Egypt is such that secondary and tertiary

branch canals must regularly be reinfested from the main water channels, however effective local clearance has been. *A. R. D. Adams*

COLLINS, R. F. & DAVIS, M. **The Chemotherapy of Schistosomiasis, Part IV. Some Ethers of 4-Amino-2-Methoxyphenol.** *J. Chem. Soc.* 1961, May, 1863–79. [28 refs.]

LE CORROLLER, Y. Sur l'action molluscocide du chlorure de baryum sur *Biomphalaria* (*Planorbis*) *boissyi*. [**Molluscicidal Action of Barium Chloride on** *Biomphalaria boissyi*] *Bull. Soc. Path. Exot.* 1960, Sept.–Oct., v. 53, No. 5, 798–802, 2 figs.

The action of barium chloride ($BaCl_2$) was tested against snail vectors of Egyptian schistosomiasis under natural conditions, *viz.* in the waters of the Nile and on the flora and fauna of this water. In these experiments the salt used was crystalline barium chloride ($BaCl_2$, $2H_2O$) and the concentrations employed refer to this form of the substance. At first, concentrations of 20 to 200 p.p.m. were distributed in 10 aquaria, each of which contained 5 litres of Nile water, 5 snails (*Biomphalaria boissyi*), 2 small fish (probably perch) from the canals, and some aquatic vegetation.

Lethal effects on the snails occurred after 48, 36 and 24 hours at average dosages of 20, 50 and 80 p.p.m. respectively. Neither the fish nor the plants were affected. (Similar results followed an experiment in which ordinary water, no plants or fishes were present.) The Nile water had a *p*H of 7·5–7·8 and a temperature of 25°C. In this there was no precipitation as an insoluble salt, at any concentration, of the $BaCl_2$. In tap-water however, rich in aluminium sulphate, which was treated with $BaCl_2$, the snails literally browsed on the sulphate of barium which was formed, without suffering any ill effects.

Experiments with fish in high concentrations of $BaCl_2$ (up to 2,000 p.p.m.) showed that fish were unharmed even after a week's exposure.

Experiments were carried out to determine the dosage of $BaCl_2$ required in the irrigation systems near Cairo where the maximum time of exposure would be an obligatory 12 hours, and it was found that concentrations of 200–300 p.p.m. would be required. This seemed to condemn the use of $BaCl_2$ under these circumstances, but further observations showed that snails exposed for 12 hours at 100 p.p.m., although not killed immediately, died within 24 hours; thus $BaCl_2$ has an immediate and a delayed action against snails according to the concentration and the time of exposure. *J. J. C. Buckley*

SAULNIER, J. & DESCHIENS, R. Appréciation colorimétrique des doses de chlorure de baryum dissoutes dans les eaux douces (actions molluscicides en prophylaxie bilharzienne). [**Colorimetric Method of Estimating Concentrations of Barium Chloride in Fresh Water**] *Bull. Soc. Path. Exot.* 1960, Sept.–Oct., v. 53, No. 5, 802–6.

A simple colorimetric method is described for estimating if the concentration of barium chloride in fresh water is high enough to kill snails. The reagent

employed is potassium chromate and the method detects concentrations between 20 to 200 p.p.m. of $BaCl_2$ with an error factor of 10 to 20%.

J. J. C. Buckley

World Health Organization. Technical Report Ser. No. 214. **Molluscicides. Second Report of the Expert Committee on Bilharziasis. Geneva, 26 September–1 October 1960.** 50 pp., 1 fig. 1961. Geneva: Palais des Nations. [Sales agent for U.K., H.M. Stationery Office.] [3s. 6d.; $0.60; Sw.fr. 2.–.]

This report summarizes the present state of knowledge about molluscicides and outlines the principles relating to their use in schistosomiasis control schemes. It also covers the operational problems in the application of molluscicides, methods for estimating their effectiveness in the field, screening techniques, new formulations and equipment for their application. The Report includes four annexes on standard methods for sampling population densities of snails, the technique of examining snails for infection by the crush method, tests for determining molluscicide concentrations and a tabulated review of molluscicides and their properties. *C. A. Wright*

Lagrange, E. La ponte d'oeufs abortifs dans la bilharziose à *Schistosoma mansoni*. [**Abortive Eggs of** *Schistosoma mansoni* **in Experimental Infections**] *Bull. Soc. Path. Exot.* 1960, Sept.–Oct., v. 53, No. 5, 791–2.

The author's summary in French is freely translated as follows:—

In 80% of mice experimentally infected with *Schistosoma mansoni* there were present, together with normal eggs, abortive forms of a clear yellow colour, reduced to the external membrane of the egg. They were very variable in number in different mice and were found in the genital tract of the female *Schistosoma*. *J. J. C. Buckley*

Barretto, A. C. Esquistossomose mansônica na Cidade do Salvador. Estudo do vetor, relações parasito-hospedeiro e aspectos epidemiológicos. [**Schistosomiasis mansoni in the City of Salvador, Bahia. Studies on the Vector, Host/Parasite Relationships and Epidemiological Aspects**] *Bol. Fundação Gonçalo Moniz.* Bahia. 1960, July, No. 16, 1–80, 13 figs., 2 graphs & 1 map. [Numerous refs.] English summary.

Intensive study of schistosomiasis in the city of Salvador has shown that there are two forms of the intermediate host *Australorbis glabratus*, one corresponding to the form *bahiensis* and the other to the form *olivaceus* but intermediates between the two were also found and there is no reason to regard them as separate.

The snails proved to be poor hosts for the parasite, they showed a marked tissue reaction to the invading miracidia and many of the exposed individuals died within 8 days of infection. Despite this low susceptibility the snails are capable of maintaining a high infection rate in the human population by

sheer weight of numbers. A single faecal examination of 2,368 people showed 16·8% to be passing eggs of *Schistosoma mansoni* but skin tests of the same group of inhabitants showed positive reactions in 83·4%. The author believes that many of the people who were negative for eggs but positive by intradermal test may have been suffering from an all-male infection.

He concludes that the high infection rate is due to poor sanitary conditions in the town. *C. A. Wright*

Barbosa, F. A. S. Alguns aspectos das relações hospedeiro-parasito entre as fases larvárias do trematódeo *Schistosoma mansoni* e o molusco *Australorbis glabratus*. [**Host-Parasite Relationships between the Larval Stages of** *Schistosoma mansoni* **and** *Australorbis glabratus*] *Bol. Fundação Gonçalo Moniz*. Bahia. 1960, Mar., No. 15, 1–44, 1 fig. [31 refs.] English summary.

This paper presents the results of many years' study on the host-parasite relationships between *Schistosoma mansoni* and its principal intermediate host in Brazil, *Australorbis glabratus*.

The author denies the existence of any kind of miracidial attraction by the snails and points out that the parasites will penetrate not only into snails in which they cannot develop but also into tadpoles. The hatching of miracidia has been shown to occur over a period of up to 11 days after the eggs have been passed by the definitive host and the maximum hatch does not necessarily occur on the first day. Infected snails kept at temperatures of 10°C. and 35°C. died more quickly than uninfected individuals, but those kept at the lower temperature and which survived lost their infections (37·6%), but only one lost the infection at the higher temperature. At the higher temperature cercarial shedding was inhibited but began again when the temperature was lowered to 33°C. Snails with a 5-day infection kept out of water for up to 150 days retained the infection in a dormant state. *C. A. Wright*

Kloetzel, K. Novas observações sôbre o tropismo do miracidio de *S. mansoni* pelo molusco *A. glabratus*. [**New Observations on Chemotaxis between Miracidia of** *S. mansoni* **and** *A. glabratus* **Snails**] *Rev. Inst. Med. Trop. São Paulo*. 1960, Nov.–Dec., v. 2, No. 6, 341–6, 2 figs. English summary.

In an earlier paper (*Rev. Brasil. Biol.*, 1958, v. 18, 223) the author demonstrated that there is a chemical attraction for the miracidia of *Schistosoma mansoni* towards their normal host-snail, *Australorbis glabratus*. The experiments described in the present paper were designed to test whether this attraction is effective over a distance or only at close quarters. The apparatus used was a Petri dish with a partition across the centre and a small opening in the partition. A series of experiments were carried out in which miracidia were placed in one side of the dish and the other side was either left empty or contained a snail. The numbers of larvae on either side of the partition were counted after a standard period of time and the results were analysed statistically. The author concludes that there is no miracidial attraction effective over a long distance but that the normal behaviour patterns of the

larvae bring them into the vicinity of the snails and the chemical attraction then keeps them there until they penetrate. *C. A. Wright*

PELLEGRINO, J. & MEMORIA, J. M. P. A reação intradérmica na esquistossomose mansoni. VI. Comportamento da resposta cutânea após terapêutica especifica. **[The Intradermal Test in the Diagnosis of Schistosomiasis mansoni. VI. Cutaneous Response after Specific Therapy]** *Rev. Inst. Med. Trop. São Paulo*. 1960, Nov.–Dec., v. 2, No. 6, 335–40, 2 figs. [22 refs.] English summary.

This paper is a further contribution by these authors to their impressive work on intradermal testing in *Schistosoma mansoni* infections [this *Bulletin*, 1961, v. 58, 704]. They used antigens made from cercariae, adult worms, and ova of *S. mansoni*, diluted 1 in 1000. 33 adult male patients aged 20–33 years, suffering from proved schistosomiasis, were tested with these antigens before and at varying periods after treatment.

Treatment was by Triostib (sodium antimony gluconate) 20 mgm./kgm. body weight, the total dose being given over a period of 5 days to 24 patients; or by Sulphantimon (antimony dimercaptosuccinate) 40 mgm./kgm. body weight, total dose given over 5 days to 9 patients. The faeces were examined 6–8 times 4–8 months after the end of treatment by Hoffman's method but rectal biopsy was not possible.

0·05 ml. of the antigen was injected intradermally and the result read after 15 minutes, areas of 1·2 sq. cm. or larger being considered positive. Tests were made before and 1, 2, 4, 6, 9 and 12 months after treatment. In 17 patients the treatment was not successful; 16 were possibly cured. In all cases all the antigens caused weals larger than the minimal positive area, and they remained positive for at least 12 months.

The authors consider therefore that the intradermal test cannot be used as a test of cure in *S. mansoni* infections. *W. K. Dunscombe*

KAGAN, I. G., PELLEGRINO, J. & MEMORIA, J. M. P. **Studies on the Standardization of the Intradermal Test for the Diagnosis of Bilharziasis.** *Amer. J. Trop. Med. & Hyg.* 1961, Mar., v. 10, No. 2, 200–207, 4 figs. [11 refs.]

These studies were carried out in Minas Gerais, Brazil. 6 different antigens were employed and the results obtained were compared in the same subjects. (Careful details are given of the preparation of the antigens and of the method of carrying out the intradermal test at different sites.) The subjects were 50 boys aged 9–15 and 40 policemen aged 20–26, all of whom had been frequently exposed to infection with *Schistosoma mansoni*. Tests were also carried out in another study on young children, boys, girls, men and women to a total of 123 who were known to be infected.

It is concluded that if the nitrogen content of the antigens is adjusted to the same concentration no difference in response will be seen with the different antigens. The skin test is not sensitive in detecting infections in children below 5 years; girls are less reactive than boys, and women less than men.

Tests on the skin of the back are more sensitive than those on the arm. The back should be employed for testing (except that adult males can be tested on the arm).

It is recommended that a dose of 0·05 ml. antigen containing 20–40 μgm. N per ml. should be injected intracutaneously with a 27-gauge needle. The test is read after 15 minutes by measuring the area of the weal. (A line was drawn round the weal with a ball-point pen, and a sheet of paper damp with alcohol was pressed on it to transfer the tracing; the area of the tracing was measured with a transparent plastic grid.) Areas of 1·0 sq. cm. or more are considered positive. It is recommended that the antigen should be prepared from the adult worm since this is easier to obtain in quantity than cercariae. *F. Hawking*

PEÑA DE GRIMALDO, Edelmira & KERSHAW, W. E. **Results obtained by Intensive Exposure of White Mice to *Schistosoma mansoni* Infection. I. Recovery and Distribution of Adult *S. mansoni* from White Mice Seven Weeks after Percutaneous Infection, the Relation between the Size of Individual Worms and the Load of Infection, and the Longevity of Heavily Infected Mice.** *Ann. Trop. Med. & Parasit.* 1961, Apr., v. 55, No. 1, 107–11, 4 figs. on 2 pls. **II. The Route of Migration of the Eggs and Adult Worms through the Capillary Sinusoids of the Liver to the General Circulation, and the Histological Reaction to the Eggs and the Adult Worms.** *Ibid.*, 112–15, 8 figs. on 2 pls.

I. Groups of 12–44 mice were infected with various numbers of cercariae of *Schistosoma mansoni* by exposure. 7 weeks later the mice were killed and the worms were examined. The results are shown in the table.

No. of cercariae per mouse	Percentage of worms recovered	Mean length in mm.	
		Males	Females
100	37·7	12·8	14·3
500	21·8	—	—
1,000	24·6	—	—
3,000	16·5	12·5	12·9
5,000	14·7	12·0	11·8
10,000	—	10·1	8·8

Briefly, the more cercariae, the smaller the percentage of worms recovered and the smaller the worms. Most of the worms were found in the portal, superior and middle mesenteric veins; with large numbers of worms (up to an average number of 735 per mouse) the portal vein was grossly dilated and so were the mesenteric glands.

II. In mice infected with 2,000 or more cercariae some adult worms were found in the general circulation, and in the lung, vesical plexus, vena cava

and heart. It is believed that these worms passed through the capillary sinusoids of the liver. There was much inflammatory reaction around viable eggs but not around adult worms. *F. Hawking*

WEINMANN, C. J. & HUNTER, G. W., III. **Studies on Schistosomiasis. XVI. The Effect of Immune Serum upon Egg Production by *Schistosoma mansoni* in Mice.** *Exper. Parasit.* New York. 1961, Feb., v. 11, No. 1, 56–62. [24 refs.]

There is some evidence that animals may acquire resistance to second infections with schistosomes and it is known that antibodies are produced; but there is little or no evidence to indicate whether the acquired resistance depends on the antibodies, or on some other mechanism. The present investigations were undertaken to investigate this point.

Serum was collected from repeatedly infected mice and it was shown to contain antibody by the circumoval precipitation reaction. This serum was given intraperitoneally in doses of 0·5 ml. every 4th day to recipient infected mice, between the 29th and 49th days after exposure to cercariae. Other mice were given normal serum, or saline as controls. On the 54th day the mice were killed, and the numbers of worms and ova present in the mice and in the faeces were estimated. [For techniques, see original.] There was no significant difference between the mice which had received immune serum and the control mice, except that the number of eggs produced per mature female was somewhat lower in those receiving immune serum than in the controls ($p = 0{\cdot}06$). Most of the eggs were found in the liver and small intestine. The average daily production of eggs per female worm was 234 (202–274). *F. Hawking*

SMITHERS, S. R. & WALKER, P. J. **Serum Protein Changes in Monkeys infected with *Schistosoma mansoni*, with special reference to the Metabolism of Albumin.** *Exper. Parasit.* New York. 1961, Feb., v. 11, No. 1, 39–49, 4 figs. [24 refs.]

The serum protein changes mentioned in the title which occur in animals infected with schistosomes were measured by the biuret method of protein determination aided by paper electrophoresis. By using homologous albumin, labelled with ^{131}I, blood volume and metabolism of this substance were simultaneously investigated.

The increase in concentration of gamma and beta globulin in infections with schistosomes of different species has been reported in mice, hamsters and rabbits [this *Bulletin*, 1957, v. 54, 839; 1958, v. 55, 910; 1959, v. 56, 463] and in other animals. Young rhesus monkeys were used in the present investigation and for particular experiments NaI and NaCl were included in drinking water. The animals were infected by dropping cercariae of *Schistosoma mansoni* on a shaved area of the groin and infection was determined by the presence of eggs in the faeces. Total serum proteins were estimated at the start and the proteins were then fractionated by electrophoresis on paper in a barbiturate buffer at *p*H 8·6. The separated fractions

were stained and scanned with a densitometer, and the percentages of each fraction present determined. Packed cell volumes and plasma volumes were measured, the latter by dilution experiments with injected albumin labelled with ^{131}I, prepared by the use of carrier-free iodide. Total body radioactivity measurements were also made.

Changes in serum proteins were detectable 6–7 weeks after infection. In every case there was an increase in gamma globulin uncorrelated with the intensity of infection; but the changes in albumin were irregular and appeared to depend on the original number of infecting cercariae. It was found that a sudden change in serum protein concentration occurred around the 7th week after infection, when eggs were beginning to appear in the faeces. The change was represented principally by an increase of total protein and gamma globulin accompanied by loss of albumin. Isotope studies were used to show the particular changes associated with albumin. The authors believe that the fall in albumin results from increased rate of breakdown.

[The paper is in parts highly technical and requires to be studied in the original.] *J. D. Fulton*

Elslager, E. F., Short, F. W., Worth, D. F., Meisenhelder, J. E., Najarian, H. & Thompson, P. E. **Effects of *Tris*(p-Aminophenyl)-Carbonium Salts and Related Compounds on Experimental Schistosomiasis and Paragonimiasis.** [Correspondence.] *Nature*. 1961, May 13, v. 190, 628–9.

A large screening programme has been carried out to test compounds against *Schistosoma mansoni* in mice. A commercial sample of *p*-rosaniline was found to have a moderate chemotherapeutic action. An investigation of the impurities present led to the isolation of *tris* (*p*-aminophenyl)-carbonium chloride $\left(H_2N\langle\bigcirc\rangle-\right)_3-C^+\ldots Cl^-$ which appeared to be active therapeutically, and to be well tolerated orally by mice and monkeys. In dogs however it caused vomiting and gastritis, so the less soluble pamoate salt was prepared (*i.e.* 4,4' methylene *bis* (3-hydroxy-2-naphthoate)). [Doses are quoted in terms of the base, without the pamoate moiety.] This compound was active against mature worms in mice in oral doses of 200–1,600 mgm./kgm./day, which were well tolerated; when given intraperitoneally it was only feebly active. The acute oral LD50 in mice was greater than 7 gm./kgm. In monkeys the compound was well tolerated by mouth and it suppressed egg production at oral daily doses of 100–400 mgm./kgm. for 10–20 days. The chloride is rapidly schistosomicidal *in vitro* at 50 μgm./ml. and it seems to be active in itself without need for conversion to an active metabolite. Its action is not reversed by large doses of *p*-amino-benzoic acid.

When mice were treated with the pamoate compound, worms began to shift from the portal veins to the liver after 7 days of treatment, and they began to die after 13 days of treatment. Just before death the worms showed reduction of pigment in the caeca of the females, atrophy of the vitellaria, and some atrophy of the oöcytes. Apparently the compound interferes with nutrition but has no specific toxic effect on the organs or tissues of the worms.

When the compound was given to dogs infected with *Paragonimus kellicotti*, there was a sustained diminution of egg production and the eggs produced were abnormal. During *in vitro* experiments with 12·5–50 μgm./ml. the adult flukes survived but the eggs produced were abnormal. Apparently the compound acts on the reproductive systems of the worms, rather than on the eggs themselves.

The structural requirements for schistosomicidal activity in these compounds are highly specific. *F. Hawking*

HALAWANI, A., ABDEL-MEGUID, M. & ABDEL-FATTAH, F. **A Study on the Effect of Antibilharzial Drugs on the Oxygen-Content of Blood, in Experimental Animals.** *J. Egyptian Med. Ass.* 1960, v. 43, No. 11, 811–15, 3 figs. on 2 pls. & 1 chart.

An investigation was made on the effect of 3 antischistosomal drugs on the oxygen content of the blood of 10 dogs, anaesthetized with chloralose. A blood sample was taken; then the drug was injected intravenously; second and third blood samples were taken, almost immediately and 3 minutes later respectively. After Fouadin (Stibophen) 1 ml. of 6% solution per 12 gm. body weight and after tartar emetic (0·5 ml. 6% solution per 15 kgm.) there were no changes in respiration or blood pressure; the oxygen content of the blood dropped 45% (Fouadin) or 55% (emetic) followed by a partial recovery to 72% and 71% respectively. After lucanthone (Miracil D) 10 mgm./kgm. body weight, respiration was irregular with periods of apnoea and blood pressure fell; these changes were only temporary; the oxygen content of the blood dropped to 50% of its previous value but it recovered completely.

[The graphs show great variation of response in the different animals and still greater variation in the oxygen content of the blood before drugs were administered. The authors' figures show an average initial blood content of oxygen of 0·014 to 0·020 cc. per 100 cc. Standard physiological textbooks give the oxygen content of arterial blood as 20 cc. per 100 cc. and that of venous blood as 15 cc. per 100 cc. Apparently there has been an error in placing the decimal point; it is not stated whence the samples were taken, so perhaps the samples were taken from venous, rather than from arterial, blood.] *F. Hawking*

ROBINSON, D. L. H. **Avian Schistosomes in Hertfordshire.** [Correspondence.] *Nature*. 1961, May 27, v. 190, 827.

Lymnaea stagnalis from 3 sources near Winches Farm Field Station (of the London School of Hygiene and Tropical Medicine), St. Albans, were found to be shedding furcocercous cercariae. The cercaria, which is briefly described, was identical in its morphological features and behaviour with *Cercaria ocellata* [this *Bulletin*, 1930, v. 27, 961]. In one of the sites, a few *L. ovata* were sometimes found to be shedding this cercaria. Attempts to infect ducks by various routes were unsuccessful. The birds common to the 3 sites are duck, moorhen and coot. *H. J. O'D. Burke-Gaffney*

EWERS, W. H. **A New Intermediate Host of Schistosome Trematodes from New South Wales.** [Correspondence.] *Nature.* 1961, Apr. 15, v. 190, 283–4.

Schistosome dermatitis is known to occur in parts of the coast of New South Wales, and is commonly acquired in sandy estuarine lakes where the snail *Velacumantus australis* (= *Pyrazus australis*) harbours the schistosome *Austrobilharzia terrigalensis* [this *Bulletin,* 1956, v. 53, 219]. Infection has been reported occasionally in marine rock pools where this snail does not occur and the present author reports the presence of schistosome cercariae in the snail *Siphonaria denticulata* from such a focus. Exposure to these cercariae resulted in a typical schistosome dermatitis.

35 of 100 *Siphonaria* from a rock platform at Cape Banks, Sydney, were found to be infected. This area is often crowded with gulls at low tide. 25 budgerigars were exposed to cercariae and immature schistosomes were recovered from the liver or lungs of 5 of them. The worms appeared to belong to the sub-family Bilharziellinae.

The Siphonariidae bear a superficial resemblance to limpets from which they may be distinguished by a groove inside the right-hand side of the shell. They are usually found in the upper littoral zone of rocky shores and have an almost world-wide distribution, but are particularly common around the Pacific and Indian Ocean shores.

Because of this wide distribution and because the usual habitat of the Siphonariidae is commonly the resting place of seashore birds, it may well be that they are hosts of larval schistosomes in many places.

H. J. O'D Burke-Gaffney

CHOW, Lien-Pin. **Epidemiological Studies of Clonorchiasis at Meinung Township in Southern Taiwan.** Reprinted from *Formosan Sci.* 1960, Aug., v. 14, No. 3, 135–68, 2 text figs. & 6 figs. on 2 pls. [30 refs.]

The area studied (Meinung Township) is situated at the north-eastern corner of Kaohsiung hsien and is almost surrounded by mountains. Its population is 45,661 and its area 124 square kilometres. There is a large lake and over 100 ponds in which fresh water fish are cultivated. The snail *Parafossarulus striatulus* occurs in these waters.

The studies comprised intradermal tests and stool examinations on the people; a survey of the snail population and examination of *Tilapia* for metacercariae; examination of dogs and pigs for *Clonorchis sinensis*; and a trial treatment of 4 infected persons with dithiazanine iodide.

Antigens of *Clonorchis, Paragonimus* and *Schistosoma* were used and the methods of making these antigens are described in detail. The intradermal test with *Clonorchis* antigen gave a positive rate of 24·6% (males 31·5%, females 19·4%) and the rate increased with the age of the people. There was close correlation between the results of stool examinations and the skin tests. Of positive reactors to the *Clonorchis* antigen 24·1% and 20·8% respectively were positive to *Paragonimus* and *Schistosoma* skin tests. Of 67 proved cases of clonorchiasis, 94% were positive by skin test with the homologous antigen, 25·4% with *Paragonimus* antigen and 22·4% with *Schistosoma* antigen.

Stool examinations gave an average of 51·88% positives, males 62·86%, females 39·68%. This high rate compared with that given by the skin tests is due to the fact that more people with positive skin tests submitted stools for examination.

Nine species of snails were collected, of which one, *Parafossarulus* (*Bulimus*) *striatulus* is believed to be the intermediate host of *C. sinensis* in that area. The fish *Tilapia mossambica* is the most frequently eaten species and 89 were examined for metacercariae. Some of the metacercariae found were given orally to a puppy which later became infected. Of 184 stray dogs examined post mortem, 26 were found infected with *C. sinensis*: 60 pigs were negative. 4 persons with clonorchiasis were treated with dithiazanine iodide which "seemed to have some effect against clonorchiasis".

J. J. C. Buckley

SUGI, H., MURAKAMI, Y., TANAKA, S. & FUNATSU, I. [**A Case Report of Cerebral Paragonimiasis**] *Igaku Kenkyu*. Fukuoka. 1961, Mar., v. 31, No. 3, 1181–6, 1 fig. [19 refs.] [In Japanese.] English summary (6 lines).

A case in a child aged 5 years.

MURAKAMI, F., MOTOMURA, K., NISHIKUBO, K., AJISAKA, S. & ERA, E. [**A Fatal Case of Pulmonary Paragonimiasis with Anteroseptal Infarction caused by Emetine Hydrochloride**] *Endemic Dis. Bull. Nagasaki Univ.* 1960, Dec. 23, v. 2, No. 4, 277–80, 3 figs. on 2 pls. [16 refs.] [In Japanese.] English summary.

PRIJYANONDA, B. & TANDHANAND, S. **Opisthorchiasis with Pulmonary Involvement.** *Ann. Intern. Med.* 1961, Apr., v. 54, No. 4, 795–9, 3 figs.

"A case is presented of opisthorchiasis with pulmonary involvement, proved by the introduction of radiopaque substance into the liver and confirmed at autopsy. This is the first case of its kind to be reported."

HSIEH, Hsien-Chen. **Studies on the Epidemiology of** *Fasciolopsis buski* **in South Taiwan.** Reprinted from *Formosan Sci.* 1960, Aug., v. 14, No. 3, 95–120, 3 maps, 2 text figs. & 12 figs. on 2 pls. [41 refs.]

Previous work on the incidence of *Fasciolopsis buski* in Taiwan showed that it is not uncommon in pigs in central and south Taiwan (as high as 60% in Tso-ying) and it was found in 79 out of 280 children in Liu-ying township, Hsien. The author's present studies were in this area where he examined 721 children in 12 villages and found 12·62% positive. The highest incidence, 47·73%, was in Chung-cheng village. There was no significant difference in sex incidence in Pa-weng and Kuang-fu but difference in age incidence was observed here, being highest in the 5–29 age-group. A tendency towards familial infection was also observed and families living near to

water plantations (*e.g.*, water caltrop) had correspondingly higher infection rates.

As a preliminary to estimating intensity of infection, the daily output of eggs by adult worms was calculated in 5 cases, by means of daily egg counts for 5 days and recovery of adult worms after treatment with tetrachlorethylene. The number of eggs passed per worm per day varied in the 5 patients from about 13,000 to 26,000 and averaged 16,000. When this figure was taken, with the average egg count as 1,081 per ml. faeces per person, and with the average stool as 150 cc., the average worm load per infected person in Liu-ying area was estimated to be about 10 worms. The most common clinical symptoms were abdominal pain and diarrhoea.

In domestic animals *F. buski* was found only in pigs. Water buffaloes, cattle, goats, dogs and cats were negative. Stool examinations of 48 pigs revealed 14 (29·17%) positive and adult worms were found post mortem in 43 (52·43%) of 82 pigs examined.

Only *Segmentina hemisphaerula* was found naturally infected with *F. buski* (1·92%); *S. formosana* was negative as were also *Thiara* spp., *Bulimus* spp., and *Viviparus* sp. Metacercariae of *F. buski* were found in the plants *Trapa bispinosa* and *Ipomoea reptans* but not in *Zizania aquatica*. Detailed results are set out in 17 tables, 3 maps and 2 figures. *J. J. C. Buckley*

LAIRD, M. **Distomiasis in Tokelau Islanders.** *Canadian J. Zool.* 1961, Apr., v. 39, No. 2, 149–52.

"Embryonated eggs of a trematode, presumably a heterophyid acquired by eating raw or inadequately cooked fish, were found in faecal concentrates from 13 (4%) of 324 Tokelauans. Positive samples originated from all three atolls of the New Zealand dependency, Atafu (08° 33′ 30″ S., 172° 30′ W.), Nukunono (09° 10′ S., 171° 50′ W.), and Fakaofo (09° 23′ S., 171° 14′ W.). Eleven of those concerned had never travelled beyond the Tokelau Group, making this the first center of autochthonous distomiasis known in the South Pacific."

DAWES, B. **On the Early Stages of *Fasciola hepatica* penetrating into the Liver of an Experimental Host, the Mouse: a Histological Picture.** *J. Helminthology.* 1961, Suppl., 41–52, 8 pls. [10 refs.]

DAWES, B. **Juvenile Stages of *Fasciola hepatica* in the Liver of the Mouse.** [Correspondence.] *Nature.* 1961, May 13, v. 190, 646–7, 1 fig.

DANG-VU-HY, HUYNH-KHAM, LE-KINH-DUE, NGUYEN-VAN-DONG & VI-PHAC. Contribuţie la studiul clinic al cisticercozei subcutanate. **[Considerations on Cysticercosis]** Reprinted from *Dermato-Venerologia.* Bucharest. 1960, Nov.–Dec., v. 5, No. 6, 481–6, 3 figs.

An account of 5 cases.

VOGEL, H. Über eine unsegmentierte, eingeschlechtliche *Taenia saginata*. [**An Unsegmented Unisexual** *Taenia saginata*] *J. Helminthology*. 1961, Suppl., 191–8, 1 fig. [10 refs.]

GHERMAN, I. Dégénérescence des oeufs d'*Hymenolepis nana* observée chez les personnes en voie de guérison spontanée. [**Degeneration of Eggs of** *Hymenolepis nana* **observed in Persons Undergoing Spontaneous Cure**] *Ann. Parasit. Humaine et Comparée*. 1960, Oct.–Dec., v. 35, Nos. 5/6, 755.

LO NIGRO, T., BRUCOLI, E. & VENEZIA, F. La *Hymenolepis diminuta* ed altri elminti tra gli scolari del borgo rurale "La Martella" di Matera. [*Hymenolepis diminuta* **and other Helminths among Children in the Hamlet La Martella, near Matera**] *Ann. d. San. Pubblica*. Rome. 1961, Jan.–Feb., v. 22, No. 1, 69–75, 1 chart. [20 refs.] English summary (4 lines).

The hamlet of La Martella is about 12 km. from the city of Matera in the extreme south of Italy, and this paper deals with the investigation of the incidence of intestinal parasites among the 146 children aged 6–13 years attending the local school. The hamlet contains 181 houses, the majority of which are in far from good condition. Practically every house has a cattle shed, hayloft and grain store.

Faeces from all the schoolchildren were examined direct, by Willis concentration, and by the Telemann method, though the latter was not very satisfactory. 47 children were found to be positive out of 146 examined. A number showed more than one infection, but the remarkable fact was the very high incidence of infections by *Hymenolepis* spp., infections by *H. nana* occurring in 19 children, and by *H. diminuta* in 14. *Trichuris* infections were found in 15, *Enterobius* (no Scotch tape method used), *Ascaris*, and *Ancylostoma* in 6, 7 and 6 children respectively.

Discussing the very high incidence of *Hymenolepis* infections and of *H. diminuta* in particular, the authors state that this parasite is only exceptionally found in man, but that various insects and rodents can act as hosts. They attribute the high infection rate to the environmental conditions in the hamlet which favoured the development of rats and insects, and they propose to investigate the rat-man cycle of *H. diminuta*. *W. K. Dunscombe*

LIS, M. & SCHANZEL, H. Der Wurmbefall bei Stadt- und Dorfhunden. [**Incidence of Helminths in Urban and Suburban Areas**] *Angewandte Parasit.* Jena. 1961, Feb., v. 2, No. 1, 23–6.

The English summary appended to the paper is as follows:—

"In the complete helminthological dissection of 26 dogs from urban areas and 24 from suburban areas, five species of Cestodes and three of Nematodes were found. The occurrence of helminths was significantly greater in those from suburban districts; *Echinococcus* was found in 8·3% of these, as compared with none in urban dogs. Detailed results are provided in tables."

EUZÉBY, J. A propos de l'échinococcose larvaire. Données nouvelles concernant la forme alvéolaire de l'echinococcose. Existence d'un foyer savoyard de la maladie. [**New Observations on Alveolar Echinococcosis. Presence of a Focus in the Department of Savoie**] *Rev. D'Hyg. et de Méd. Sociale*. Paris. 1960, July–Aug., v. 8, No. 5, 428–38, 2 figs.

The knowledge of the occurrence of a serious form of hydatid disease in Savoie and Upper Savoie led the author to investigate if the condition was due to alveolar echinococcosis. In one suspected region, dogs were examined post mortem without success. Autopsy of a fox, however, led to the discovery of 20 adult worms which were identified as *Echinococcus multilocularis*. It is concluded therefore that alveolar hydatid exists in France, notably in Upper Savoie and that systematic research may reveal its presence in other Departments.

This paper also presents a condensed but systematic account of hydatidosis due to the two causal organisms, *E. granulosus* and *E. multilocularis*; their specific differentiation in the adult and larval stages; their respective hosts and geographical distribution; their epidemiology; the form and development of the lesions due to the larval infection; and recommendations for control of the disease. It is a useful analysis of current knowledge on this important subject. *J. J. C. Buckley*

SEREDA, M. M., SHERMAN, L. & SMITH, E. M. G. **Alveolar Echinococcosis.** *Canadian Med. Ass. J.* 1961, May 20, v. 84, No. 20, 1138–9, 3 figs.

A case in Alberta, probably acquired in Germany.

CAMERON, T. W. M. **The Development and Experimental Pathology of *Echinococcus multilocularis* and Alveolar Hydatid.** *Parassitologia*. Rome. 1960. Dec., v. 2, No. 3, 371–80.

"*E. multilocularis*, which has a normal sylvatic cycle involving the Arctic fox and rodents, is confined in Canada to Banks Island in the Arctic Archipelago. It is maintained easily in the laboratory and has been the subject of an intensive *in vivo* and *in vitro* investigation. It has been grown successfully in muskrats, cotton rats, lemming, and gerbils, less successfully in white mice and hamsters, and not at all in guinea pigs, rabbits, pigs, and sheep. In some rodents, it develops into a microcystic multilocular mass with great rapidity; in others, it tends to become unilocular and in muskrats and lemming it may become alveolar (sensu Dévé). As a result of both the experimental and comparative pathology studies, it is concluded that human alveolar hydatid can result from either an *E. multilocularis* or an *E. granulosus* infection but that the former may be less chronic and more progressive than the latter.

"*E. multilocularis* has been transferred successively in its cystic stage from rodent to rodent with a tendency to a progressive increase in growth rate. This work has also shown that some morphological characters, such as the number of hooks, are environmentally plastic. Partial success in growth

in purely synthetic culture media has been attained. Cysts from primary infections—but not from secondary ones—will produce new cysts in culture and may develop scoleces. Scoleces readily vesiculate and may do so in a variety of ways, suckers being absorbed and hooks shed, and scolex formation begun. Many scoleces do not vesiculate but remain alive for weeks, growing in size, gradually losing the granules, developing a well defined excretory system, and showing early segmentation. Immature scoleces continue development so far as production of hooks is concerned but none has developed suckers."

CAMERON, T. W. M. **The Incidence and Diagnosis of Hydatid Cyst in Canada,** *Echinococcus granulosus* **var.** *canadensis*. *Parassitologia*. Rome. 1960, Dec., v. 2, No. 3, 381–90, 1 map.

The incidence of hydatid cysts in north-western Canada has been determined by the Casoni reaction and was shown to be high. In Indians, for instance, it varies from 10% in northern British Columbia to 40% in the Yukon. About 23% of Esquimaux in the eastern Arctic also give positive reactions.

In animal hosts the cysts are found in the lungs of deer (moose, elk, reindeer and caribou), but they have not been found in domestic herbivores or rodents. Wolves are the natural hosts of the adult parasite, but dogs can be readily infected. The human infections are derived from dogs which have fed on the lungs of deer, and in many areas 25% are infected. As these dogs closely associate with man under unhygienic conditions, a high rate of human infections is inevitable. A higher rate of positive reactions by both intradermal and serological tests was obtained with antigen prepared from deer cysts than with the standard Australian antigen prepared from sheep cysts.

In precipitation, complement-fixation and haemagglutination reactions on sera of Canadians and those of native Australians and Europeans it has been found that more complement-fixation reactions were obtained when sera of Canadian carriers were tested with hydatid fluid of Canadian origin, and the converse also holds, that sera of native Europeans and Australians gave significantly more positive reactions when tested with New Zealand hydatid fluid. Although hydatid fluid from moose, elk, reindeer and man were equally potent antigens in complement-fixation, no precipitins could be demonstrated for these antigens in animal or human immune sera.

Haemagglutination reactions for serological diagnosis have proved promising. Protein fractions of laminated membranes gave positive reactions in the indirect (tanned cell) haemagglutination, and polysaccharide fractions from the same source were effective in direct and conditioned haemagglutination.

Although the cyst is a typical hydatid, on account of biological differences the name of *E. granulosus* var. *canadensis* is proposed. *Philip Manson-Bahr*

NEGHME, A. & SILVA, R. Revisión de los datos sobre epidemiologia de la hidatidosis en Chile, en los años 1958 y 1959. **[Revision of Data on the Epidemiology of Hydatid Disease in Chile during the Years 1958 and 1959]** *Bol. Chileno de Parasit.* 1961, Apr.–June, v. 16, No. 2, 27–9.

The English summary appended to the paper is as follows:—

"The authors report the results of a survey on some epidemiological aspects of hydatid disease in Chile. The data were obtained through the Chilean National Health Service and cover the years 1958 and 1959. During that period, 1,173 new cases of hydatid disease and 83 readmissions were recorded. The rate is 8·9 and 7·6 per 100,000 for 1958 and 1959, respectively.

"Distribution per geographical area revealed the highest incidence in the Central and Southern zones. However, a net increase of the rate of new cases was observed in the Northern zones and the zones of the steppes.

"Distribution per sex showed a predominance of male patients. The rate was 53% in 1958 and 54% in 1959. As regards age groups, the distribution remained approximately the same as before, the group most frequently affected being that between 15 and 45 years of age. The fact is pointed out that 154 of the cases were diagnosed in children below the age of 14.

"In the period covered by our study, 55 individuals (4·6% of the total) died from this disease. The rate is somewhat lower than in the foregoing years (6%).

"Average stay at the hospital was 40·7 days in 1958 and 45 in 1959."

ROBINSON, R. G. Complications neurologiques de la maladie hydatique. [**Neurological Complications of Hydatid Disease**] *World Neurology*. Minneapolis. 1961, May, v. 2, No. 5, 426–34. [30 refs.]

YASURAOKA, K., HOSAKA, Y. & OGAWA, K. **Survival of** *Ancylostoma duodenale* ***in vitro***. *Japanese J. Med. Sci. & Biol.* 1960, Dec., v. 13, Nos. 4, 5 & 6, 207–12, 7 figs. [11 refs.]

In these experiments *Ancylostoma duodenale* from an infected dog survived for more than 4 months *in vitro* in human serum and the eggs laid developed to filariform larvae in chick embryo extract under aseptic conditions.

[See also this *Bulletin*, 1957, v. 54, 1109.]

FARIÑAS GUEVARA, P. & GRILLO MARTINEZ, R. Reporte de un caso de *Larva migrans* tratado con Fenilbutazona. [**A Case of Larva Migrans treated with Phenylbutazone**] *Bol. Soc. Cubana de Dermat. y Sifil.* 1960, Dec., v. 17, No. 4, 153–5.

The authors, in Cuba, saw a patient with a lesion of larva migrans in the foot. Owing to secondary infection it could not be treated with the usual applications. The patient was given 600 mgm. of phenylbutazone daily by mouth in 3 divided doses for 10 days. The lesions improved rapidly and the patient was discharged cured in 13 days. The drug was well tolerated.

H. J. O'D. Burke-Gaffney

Biocca, E., Paggi, L. & Orecchia, P. **Further Studies on Trichostrongyliasis in Jewish Communities in Iran.** *Parassitologia.* Rome. 1960, Dec., v. 2, No. 3, 345–52, 1 text fig. & 4 figs. on pl.

"Experimental studies were conducted to establish whether *Trichostrongylus orientalis* is a parasite present not only in men but also in domestic animals in Iran and whether other species of *Trichostrongylus* are responsible for human Trichostrongyliasis. For this purpose we have experimentally infected *Ovis aries* with larvae obtained from faecal material—sent by air from Iran—of men and animals. We have also identified the trichostrongylides collected from the small intestine of some Iranian *Ovis aries* and *Capra hircus* which lived in communities where human Trichostrongyliasis was present.

"The following results were obtained:

"1. *Trichostrongylus orientalis* was only present in the small intestine of *Ovis aries* experimentally infected with larvae from men and never in *Ovis aries* experimentally infected with larvae from animals (*Bos taurus, Capra hircus, Equus asinus* and *Ovis aries*) or in Italian *Ovis aries* maintained as control.

"2. *Trichostrongylus axei, capricola, colubriformis* and *vitrinus* were collected in the small intestine of *Ovis aries*, experimentally infected with larvae from domestic herbivorous animals from Iran.

"3. Further studies are still necessary to establish the significance of *Trichostrongylus colubriformis* and *T. vitrinus* as possible human parasites in Iran because these two species were present not only in the experimentally infected animals but also among the Italian *Ovis aries* used as controls.

"4. The number of cases of *Trichostrongylus* infection among Jews in Iran is higher than we had assumed in our previous inquiry based on a simplified egg concentration method (Fülleborn simplified method) revealing only severe infections."

[See this *Bulletin*, 1960, v. 57, 263.]

Soresco, Angela, Panaitesco, D., Ciurea, C. & Ianco, Larissa. L'étude de l'embryogénèse des oeufs d'*Ascaris lumbricoides* dans des conditions variées d'oxygénation du milieu. [**A Study of the Embryogenesis of the Eggs of *Ascaris lumbricoides* in Various Conditions of Oxygenation of the Culture Medium**] *Arch. Roumaines Path. Expér. et Microbiol.* 1961, Mar., v. 20, No. 1, 129–36. [17 refs.]

The English summary appended to the paper is as follows:—

"The embryogenesis of eggs of *Ascaris lumbricoides* is reported in the speciality literature only to be possible in media containing 5·5 to 7 mg. O_2 per liter of fluid.

"In a first series of experiments the authors have comparatively investigated eggs of *Ascaris lumbricoides* whose development had been accelerated by means of a 'biochemical stimulus' and eggs which had not been subjected to any influence of this kind. In both groups the development of the eggs was found to be possible, even in anaerobic conditions.

"In another series of investigations in which only eggs of *Ascaris lumbricoides* were used whose development had been accelerated by means of a 'biochemical stimulus,' the authors followed up their development at a temperature of 20°C. in solutions in which the amount of oxygen had been quantitatively determined (4·0 mg. per liter, down to 0·09 mg. per liter).

"In these conditions embryogenesis is slow. Its duration increases in direct proportion to the decrease of oxygen concentration in the medium. Control eggs transferred from anaerobic media into aerobic media (same temperature during incubation) resumed their normal rate of development.

"The infesting ability of the eggs hatched under these conditions is not altered by the degree of aerobiosis or anaerobiosis in the medium in which embryogenesis takes place.

"The present experiments are a contribution to the epidemiological study of ascaridiosis, in as much as they prove the ability of eggs of *Ascaris lumbricoides* to develop in anaerobic conditions such as may possibly prevail in the environment, without losing their infesting properties."

GAZZINELLI, G., GUIA, M. M., NEVES, A. G. A., PUDLES, J., BERALDO, W. T. & DA SILVA, W. D. **Purification of the Toxic Fractions from *Ascaris lumbricoides* and their Effect on the Guinea Pig.** [*Correspondence.*] *Nature*. 1961, May 27, v. 190, 813–14, 1 fig.

DELLA TORRE, H. A. & ARÁOZ, J. S. Abdomen agudo por Ascariasis. [**Acute Abdomen due to *Ascaris***] *Semana Méd.* 1961, Mar. 30, v. 118, No. 14, 558, 1 fig.

VARMA, B. K., SINHA, V. P. & DASS, N. L. **Filariasis in Sultanganj and its Suburbs (Bihar).** *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1960, Sept.–Nov., v. 8, Nos. 5/6, 149–52.

"The filaria survey at Sultanganj and its suburbs shows that

"1. (*a*) the filarial disease rate is 21·6 per cent.,
(*b*) the infection rate is 18·5 per cent., and
(*c*) the infection rate in *Culex fatigans* is 10·1 per cent.

"2. The filaria infection and disease manifestation are noted at the age of 3 and 4 respectively in both the sexes.

"3. *W. bancrofti* is the species recorded."

ROY, R. G. & SHARMA, G. K. **Filaria Infection in *A. hyrcanus* var. *nigerrimus* at Cuttack, Orissa.** [Research Notes.] *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1960, Sept.–Nov., v. 8, Nos. 5/6, 161.

DATTA, S. P. **Filaria Survey in Mission Girls' Hostels in Pondicherry Town.** *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1960, Sept.–Nov., v. 8, Nos. 5/6, 131–6.

Pondicherry was transferred to the Government of India in November 1954 after the French occupation lasting 280 years. There are no records of any filaria survey having been carried out in this settlement.

Pondicherry is situated on the eastern coast in the filarial endemic belt. The maximum and minimum temperatures are 36° and 20·5°C. and are lowest in December to January and highest in May to June.

This paper records observations on a filarial survey carried out among females only, residents in 3 mission girls' hostels, situated in different parts of the town. The work was carried out from November 1959 to January 1960 at night between 21.00 and 23.00 hours. All the inmates were examined.

In a total of 316 persons the microfilarial rate (*Wuchereria bancrofti*) was 9·1%. The lowest age at which infection was found was 4 and the highest 75 years. The infection was present in all age-groups, except the years 41–50, and the general trend of incidence rose gradually up to 20 years and thereafter remained static. The disease rate was very low (1·3%) and out of the total only 4 persons were found with elephantiasis of the legs; none of those with manifestations showed microfilariae in the blood. The endemicity rate varied in the three hostels. The third, which is situated in the industrial area close to a sewage canal with stagnant water, showed the highest infection and endemicity rates.

The following species of mosquitoes were present:—*Culex fatigans, C. vishnui, C. sitiens, Armigeres* sp., *Aedes aegypti, Anopheles hyrcanus* [*?sinensis*], *A. subpictus.* One specimen of *C. fatigans* only was found infected with larvae of *W. bancrofti.* *Philip Manson-Bahr*

HERTWIG, F. & OBERDOERSTER, F. Beitrag zu einigen Problemen der parasitären Krankheiten in China. 3. Mitteilung: Filariasis. [**Problems of Parasitic Diseases in China. 3. Filariasis**] *Ztschr. f. Tropenmed. u. Parasit.* 1961, v. 12, No. 1, 41–8. [19 refs.]

WILSON, T. **Filariasis in Malaya—a General Review.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1961, Mar., v. 55, No. 2, 107–29, 8 figs. [53 refs.] Discussion 130–34 [SYMES, C. B.; HAWKING, F.; MANSON-BAHR, P.; SELWYN-CLARKE, S.; MATTINGLY, P. F.; MACARTHUR, W.; WILSON, T. (in reply)].

In this excellent review of filariasis* in Malaya, Dr. Wilson traces the history of the subject, from the first observations of DANIELS in 1908, through various surveys, up to the time of the systematic investigation that was begun

* The "anthropocentricity" implicit in this title is unfair to the filarial fauna of Malaya which is so rich in genera other than the medically important *Wuchereria* and *Brugia.* It is conceivable that *Onchocerca, Setaria, Dirofilaria, Stephanofilaria, Edesonfilaria,* etc., may, like Dr. Hoare [this *Bulletin*, 1961, v. 58, 471], "regard *Homo sapiens* as just another [animal] species"—and a very inhospitable one!

at the Institute for Medical Research in 1936. From 1936 to 1940 information regarding the disease was notably augmented. It was found to be endemic in rural areas, especially in Pahang and Perak where the causal organism is *Brugia* (formerly *Wuchereria*) *malayi*. *W. bancrofti* was apparently rare and believed to be imported. During that time the significant discovery was made [by POYNTON and HODGKIN, this *Bulletin*, 1939, v. 36, 839] that monkeys harboured *malayi*-like microfilariae in their blood. On the resumption of investigations in 1946, surveys were carried out in Province Wellesley, Kedah, Penang, Pahang and Johore and a filariasis research unit of the Institute of Medical Research was established at Kuantan in East Pahang in 1953. In the subsequent years much new knowledge was forthcoming and this forms the basis of the present review. [Dr. Wilson himself contributed substantially to these researches.]

The methods, diagnostic criteria and definitions employed in the investigations having been stated, the author discusses the parasites.

The Parasites

The predominant infection in man is *B. malayi* in the Federation of Malaya. *W. bancrofti* occurs in several small rural foci and one suburban one in Penang Island; it is also endemic in Singapore. *B. malayi* occurs in almost every State in the Federation and is essentially rural.

Two forms of infection with this parasite were found, each with distinct patterns of microfilarial periodicity. In Penang it is strictly nocturnal and in East Pahang it is semi-periodic, *i.e.* microfilariae can be found at any time; but there is also a nocturnal rise.

The recovery of adult worms from the lymphatics of naturally and experimentally infected animals led to the isolation of two distinct species, *B. malayi* of man and animals and *B. pahangi* of animals. Although *B. pahangi* has not been found as a natural infection in man, it has on one occasion been transmitted experimentally to a human volunteer.

The discovery of naturally infected animal hosts of *Brugia*, both wild and domestic, initiated a variety of transmission experiments. Cats were found to be easily infectible with *B. malayi* from man. "The semi-periodic *B. malayi* is more easily transmissible to animals than the periodic form, and the apparent permanency of the infections thus transmitted implies that some at least of the natural infections found will constitute a reservoir of infection transmissible to man."

Confirmation of this was achieved when 4 volunteers were inoculated with *B. malayi* (2) and *B. pahangi* (2) from animals. Clinical signs of infection occurred in all 4 volunteers and, in 2, microfilariae of *B. malayi* and *B. pahangi* respectively appeared in the blood subsequently as low-grade infections.

The vectors

In the coastal rice fields and open swamps of north-west Malaya, where the periodic form of *B. malayi* occurs, *Anopheles barbirostris*, *Mansonia indiana*, and *M. uniformis* have been found naturally infected, at an average rate of about 0·2%. That these species are highly susceptible to *B. malayi* has been confirmed by experiments, which have also shown that it does not develop readily in *M.* "*dives*" (= *M. longipalpis*) and the similar *M. bonneae* [this *Bulletin*, 1958, v. 55, 294]).

The semi-periodic form of *B. malayi* occurs typically in the lower reaches of the Pahang and Perak rivers, where the topography comprises narrow strips of inhabited and cultivated land on the banks of the rivers, beyond which are large areas of freshwater swamp forest, the breeding place of *M. "dives"*. This mosquito, with *M. annulata* and *M. uniformis* which are more limited in distribution, is naturally infected with the semi-periodic *B. malayi*. An average infection rate of 0·6% has been found in it and it is easily infected experimentally (100%), the infective stage developing in 10·5 days. The other two species are also very susceptible but in *A. barbirostris*, which is not common, development is very slow.

"The presence of natural infections with *B. malayi* and *B. pahangi* in animals makes interpretation of the data on mosquito infections in Pahang very difficult. There is surprisingly little difference between the infection rate in mosquitoes caught in kampongs where over 40 per cent. of the inhabitants are microfilaria carriers, and the rate in mosquitoes caught in virgin jungle several miles from the nearest habitation."

The vector in the hill forest where aborigines are infected is unknown though *Aedes* (*Finlaya*) *chrysolineatus* which is common there can readily be infected.

The most important vector of *B. pahangi* seems to be *M. annulata*; *M. "dives"* is not nearly so good a host for *B. pahangi* as for *B. malayi*. *Armigeres obturbans* is an excellent experimental host for *B. pahangi*.

The animal hosts

Surveys of infection in animals were mainly made in East Pahang. *B. malayi* or *B. pahangi* or both were found in 4 species of primates, 8 species of carnivores, one edentate, one insectivore and one rodent. Leaf monkeys, 26 positive for *B. malayi* out of 35 examined (74%), may be a reservoir which would interfere with control measures. Infections in animals are rare where the periodic form occurs in man (Kedah and Penang). In areas where man is free from filariasis, infections in animals with *Brugia* are very rare.

The human host

"Susceptibility to infection does not seem to vary with race, but there is a great difference in the extent to which the various races living in Malaya are exposed to infection." The vectors are rural, therefore *B. malayi* is a rural infection; Malays are mostly rural, therefore they are the chief sufferers. Chinese and Indians living in endemic areas are infected to the same extent as Malays. Clinical manifestations are the same in areas where the periodic and semi-periodic forms occur; but there are slight differences. For example, the trend of the infection by age and sex varies; in Pahang (semi-periodic) the infection rates are higher than in Kedah-Penang, and the females of 10–55 years have a lower incidence. Children in both areas become infected very early. Details of the clinical features of the disease have been given by Turner [*ibid.*, 1959, v. 56, 862] and these are similar in the two forms of *B. malayi*.

In both Pahang and Kedah-Penang the microfilaria rate in persons with elephantiasis was found to be lower than in those without elephantiasis; where both legs are affected the chances of finding microfilariae are less.

In areas of the semi-periodic form of infection no direct relationship was

found between infection rate and microfilarial density, though certain inexplicable density-distribution differences were observed between communities having a high (57%) infection rate and a low (33%) infection rate.

Analysis of microfilaria rate and density in 294 persons examined 3 times (1950, 1953 and 1957) and in 1,601 examined twice (1953 and 1957) revealed a natural fluctuation in incidence. Further analysis of the data relating to the 1,601 persons showed that the fluctuations were confined to a relatively small proportion of those examined, when the group was divided into those without elephantiasis at either examination and those with elephantiasis at one or both examinations. Although each person receives an infective bite about 30 times per year, a large number showed no signs of infection at either examination. "One must conclude that many people develop some degree of immunity to infection, an immunity which enables them either to throw off the infection completely, or to suppress it below detectable levels."

Control measures

"Control measures have consisted of attempts to eliminate the parasite reservoir by mass treatment of the human population, or attempts at vector control, or a combination of these measures. Some of the pilot schemes have now been in progress for 5 years."

For mass treatment a regime of 5 mgm. diethylcarbamazine citrate per kgm./body weight once a week for 6 doses was adopted for general use; it proved practicable and reasonably effective, but though it reduced the number of circulating microfilariae, any remaining ones were still infective for mosquitoes. *Brugia*-infected cats were treated with the drug and it proved to be not nearly so effective as in the treatment of man.

Measures against vectors in Kedah-Penang comprised clearance of water plants; in Pahang this was impossible to carry out so house spraying with residual insecticides was tried and found effective. "Trials in window-trap huts showed that a dose of 100 mg. dieldrin per sq. ft. would maintain a 24-hour kill of over 50 per cent. in *M.* '*dives*' for about 6 months and this dose was used in a field trial."

The results of mass treatment in Kedah have recently been reported by Hassan [*ibid.*, 1960, v. 57, 505]. There was a reduction from 26% to 1·5% in the microfilaria rate in 3,135 persons re-examined 7–12 months after treatment and a reduction in the mean microfilaria count from 2·6 to 0·2 per cmm. blood. Re-treatment of positive persons (815) showed that there was a great reduction 2 years later in both microfilaria rate and density. In East Pahang both mass treatment (3 areas) and house spraying with dieldrin (1 area) were tried; a fifth area was left untouched as a control. The results are illustrated clearly in a diagram. The results of drug treatment in Pahang were not so encouraging as those obtained in Kedah and as to the house spraying, there was a fall in the microfilaria incidence and average density in area (4) but this may have been due to natural causes. "The presence of the animal reservoirs of infection in Pahang may be the main reason for this difference in results [between Kedah and Pahang], but the difference in the prevalent form of *B. malayi* in the two areas may also be important. A combination of drug and insecticide control is being tried in another area in Pahang, but the results are not yet predictable."

Some of the points made in the discussion were as follows:—

Mr. C. B. SYMES expressed his gratitude to Dr. Wilson for his report and pleasure at hearing "what is I hope only the first chapter of the story of filariasis in Malaya". He commented on discrepancies that occur in estimations of microfilarial rates and densities in people, and their importance in studies on control measures especially in regard to reduction of rates and densities after treatment with diethylcarbamazine. He suggested that low microfilarial densities in people who were negative at one examination and positive subsequently and *vice versa*, might account for the changes of incidence in Table III which had been ascribed to natural causes. He asked if the reductions in infection rate (98% to 0·5%) and microfilarial density (99·6% to 0·02%) achieved at Kedah by various control measures are considered (after the 11% correction is applied) to have reached a point where the infection may die out. In Tahiti the figure of 5% infection rate and microfilarial density of 1 or less per 20 cmm. are suggested as limits below which *W. bancrofti* will disappear. He also asked how much of the reduction in Kedah could be attributed to anti-mosquito measures and what degree of vector control was achieved. He enquired if in the forest swamp breeding areas of the larvae were always widely distributed or if they were ever found concentrated. "I must admit that I find it refreshing to encounter species of insects like those of *Mansonia, Anopheles gambiae* and *C. fatigans* that promise to make good demands on field biology for their reduction rather than on the application of more poisons."

Commenting on the discovery of more and more rural foci of *W. bancrofti* infections, transmitted apparently by anophelines, he asked if *C. fatigans* is present or not and if present whether it is a poor carrier. Dr. Wilson recorded the tolerance of a strain of *C. fatigans* to an urban strain of *W. bancrofti* and its intolerance to a rural strain of this helminth. "This is, I think, the first field observation of its kind. If this selective reaction of the mosquito to what seem to be different strains of filariae, occurs in other bancrofti areas of the world it may help to explain the many different vector potentials of *C. fatigans* recorded throughout its range, not only differences in geographically widely separated areas but those in closely contiguous areas such as the east coast strip of Kenya where Dr. Heisch recently recorded a much higher rate of infection in *C. fatigans* north of Mombasa than further south. But I suspect that strains of the fatigans complex itself will complicate the picture."

Dr. F. HAWKING remarked that although in Malaya an animal reservoir of infection may be present, it exists for only one subspecies of *B. malayi*. "Filariasis in most parts of the world outside S. E. Asia is due to *Wuchereria bancrofti*, for which no animal reservoir has ever been demonstrated. Accordingly I hope that Dr. Wilson's findings will not discourage planners elsewhere, who are hoping to eradicate filariasis by drug administration and/or mosquito control." The reduction of filariasis in Malaya by administration of diethylcarbamazine was most encouraging and this measure should be continued in Malaya and elsewhere.

Sir Philip MANSON-BAHR said that the problem of periodicity had become more puzzling than ever. He considered the phenomenon to be a specific character. "As regards the transmission of minimal infections with microfilariae the selective capacity of the mosquito had been first shown by Patrick Manson in Amoy and this had been confirmed by F. W. O'Connor.

It is possible that the elaborate biting apparatus enables the insect to 'fish out' microfilariae from the peripheral blood."

Sir Selwyn SELWYN-CLARKE said that the local differences in the insect carrier in Malaya had a parallel in the South Pacific where, in Papua and New Guinea, *A. punctulatus* was the principal carrier whereas elsewhere it was *Aedes polynesiensis* and *A. pseudoscutellaris*. He suggested that the higher incidence of elephantiasis in the legs of men in Malaya was due to their greater liability than women to sustain cuts, scratches and leech bites while working or walking in the jungle. "A proportion of these become infected and give rise to or aggravate periodic attacks of lymphangitis which eventually produces the elephantoid leg."

Mr. P. F. MATTINGLY asked "if enough was known of the biting cycles of *Anopheles barbirostris* and *Mansonia dives* for these to be compared with the microfilarial density cycles in the periodic and semi-periodic forms of *Brugia malayi*. If there was a correspondence it would be interesting to know exactly how close this was. Nocturnal mosquitoes exhibited at least two types of biting cycle, an eo-crepuscular type which might approximate to the semi-periodic microfilarial cycle and a type with peak activity nearer midnight which would match the periodic cycle better. It would also be interesting to know whether there was any difference in periodicity between the urban and rural forms of *Wuchereria bancrofti* in Malaya."

The President, Sir William MACARTHUR, enquired about the difference in susceptibility of Liverpool and Malayan strains of *Aedes aegypti* to infection with *Brugia*, and whether it could be explained by the long or more complete estrangement of the Liverpool strain from its natural mode of life. He quoted the example of kala azar and *Phlebotomus* which was found to be able to transmit the disease only when fed in accordance with its habitat in the wild state. He also quoted a personal observation on the feeding response of rat fleas when given their first opportunity of taking human blood. Starved fleas would not bite when a bare arm was inserted into a cage, nor when in glass containers applied to various parts of the body. "Then, reflecting that all this was contrary to what they would experience in nature, I undressed and went to bed, and when the coverings were pleasantly warmed up, I let several of the fleas loose in my bed, whereupon they attacked me almost at once, to my great satisfaction. Accordingly I think that when writers state that certain blood-sucking insects bite man reluctantly or not at all, or behave in some peculiar way, the conditions in which the tests were made should always be clearly explained."

Dr. Wilson (in reply) agreed with Mr. Symes's suggestion and said that some at least of the variations found at the repeated surveys might result from the use of 20 cmm. blood films. "Perhaps the most interesting feature of the repeated surveys is the high proportion of persons who showed no signs of infection despite years of residence in this highly endemic area." *M.* "*dives*" larvae may occur in concentrations but the potential breeding area is enormous. "The antimosquito measures in Kedah seem to have reduced vector numbers, but to what extent we do not know . . . Very few *C. fatigans* could be caught in the rural focus of *W. bancrofti* which was investigated by Dr. Wharton."

He agreed with Dr. Hawking that diethylcarbamazine is a very useful control measure and that caution should be used in employing toxic drugs.

To Sir Philip Manson-Bahr's reference to occupation in relation to sex differences in incidence in the Pacific he replied that in Pahang women are exposed to the same risk of infection as men.

To Mr. Mattingly's query about biting cycles he said that owing to lack of data there was no satisfactory answer.

In reply to the President, he said that the Liverpool colony of *Aedes* was 20 years old and this fact could affect the results of experiments with this strain. *J. J. C. Buckley*

RAMACHANDRAN, C. P., EDESON, J. F. B. & KERSHAW, W. E. ***Aëdes aegypti* as an Experimental Vector of *Brugia malayi*.** *Ann. Trop. Med. & Parasit.* 1960, Oct., v. 54, No. 3, 371–5. [12 refs.]

The natural vectors of *Brugia malayi* are mosquitoes of the *Mansonioides* group. However, the authors successfully infected *Aedes aegypti* by feeding them on cats infected with the periodic and semi-periodic forms of *B. malayi*. Differences in susceptibility to infection were observed in the three strains of *A. aegypti* used in the experiments. The Liverpool strain, originating from W. Africa, was most susceptible and about 30% of the fed mosquitoes showed infective forms of the worms. The infection rate in the Cooper strain of mosquitoes [the original source of this strain is not given] was only slightly less (20–26%) while a Malayan strain from Kuala Lumpur was least susceptible with an infection rate of less than 5%.

Transmission was obtained by injection of infective forms from the Liverpool mosquitoes into clean cats.

[The authors quote the paper by KARTMAN (this *Bulletin*, 1953, v. 50, 835) on the differences in susceptibility to infection of strains of *Aedes aegypti* with *Dirofilaria immitis*. ROUBAUD (*ibid.*, 1937, v. 34, 891) obtained similar results with the same vector-worm combination. The experiments of Kartman would suggest a genetic influence on susceptibility since the proportion of susceptible and refractory mosquitoes in a heterogeneous population could be varied by selective breeding.]

[See also *ibid.*, 1948, v. 45, 264.] *M. G. R. Varma*

LAPA, J. D. S. Contribuição ao estudo da oncocercose ocular em Angola. [**Ocular Onchocerciasis in Angola**] *Anais Inst. Med. Trop.* Lisbon. 1960, Jan.–June, v. 17, Nos. 1/2, 173–200, 14 figs. (1 coloured on pl.). [15 refs.] English summary (8 lines).

Simulium damnosum is the main vector of onchocerciasis in Angola and this report deals with an investigation into the ocular manifestations of the disease in an area about 120 km. from Luanda. 100 inhabitants of the region were examined by slit lamp and by the ophthalmoscope. All had previously been examined for microfilariae by skin snips, when 60 had been found positive.

The ocular conditions are divided into 2 types:—

(A) *Lesions of the anterior segment*

No case of specific filarial conjunctivitis was found, no keratitis, no iritis,

no filarial pannus. In 16 patients deposits of pigment on Descemet's membrane were found or pigmentary infiltration of the limbus and cornea. Slit lamp examination showed numerous microfilariae swimming in the aqueous.

(B) *Lesions of the posterior segment*

Retrobulbar optic atrophy was found in 6 patients, and deposits on the retina in 16. A chorioretinitis (Ridley type) was relatively frequent but no exudates or haemorrhages were seen. In places the choroid and retina had completely disappeared leaving only the sclerotic. All the retinal conditions seemed to begin with a peripapillitis, and the macula was often affected. Blind persons totalled 7%, and severe visual defect was found in 16%.

Conjunctival snips were positive in 2 of 22 patients in whom skin snips had been negative; if the skin snips were positive the conjunctiva was also. In many patients diethylcarbamazine caused a real ciliary injection and this was considered diagnostic while the Ridley type of chorioretinitis was regarded as specific. This lesion seemed to start round the optic nerve, possibly through passage of the microfilariae along the chorioretinal vessels or through a toxic-allergic condition due to filarial disintegration products. Both diethylcarbamazine and a filaricide are suggested in treatment, and excision of the onchocercomas, but the retinal lesions are irreversible. *W. K. Dunscombe*

ZAIMAN, H., HOWARD, R. G. & MILLER, C. Joyce. **Immune Response in Rats infected with *Trichinella spiralis* Larvae subjected to Roentgen Radiation.** *Amer. J. Trop. Med. & Hyg.* 1961, Mar., v. 10, No. 2, 215–19, 1 fig. [15 refs.]

Rats were immunized with 500 *Trichinella spiralis* larvae which had been irradiated with various doses of X-rays up to 20,000 r. One month later they were challenged with 5,000 non-irradiated larvae and the degree of immunity was estimated by counting the number of larvae present in the muscles 2 months after the challenge. Various control groups were infected with immunizing or challenge larvae only.

The number of larvae found in rats which received only the immunizing dose of larvae decreased in inverse proportion to the amount of irradiation, so that rats receiving larvae without irradiation ultimately contained 145,600 larvae each (mean), but rats immunized with larvae irradiated with 20,000 r contained only 7 larvae (*i.e.* one rat out of 14 contained 100 larvae). Control unimmunized rats which received the challenge infection contained 320,400 larvae. Rats which received both the immunizing dose of irradiated larvae and the challenge infection, contained larvae ranging from 500 per rat in the group immunized with larvae which received 8,000 r irradiation to 242,200 larvae in the group, immunized with larvae which received 20,000 r irradiation. Apparently larvae irradiated with 8,000 r produced the maximum immunity observed in these experiments. This appears to be the optimum quantity of irradiation to give to larvae (under the conditions of this experiment) to produce the maximum degree of immunity.

[See also this *Bulletin*, 1955, v. 52, 566 *ter*; 1960, v. 57, 272.] *F. Hawking*

DEFICIENCY DISEASES

Food & Agriculture Organization of the United Nations. **FAO Nutrition Meetings Report Ser. No. 25. Report of the FAO/WHO Seminar on Problems of Food and Nutrition in Africa South of the Sahara, Lwiro, Bukavu (Congo), 18–29 May 1959.** pp. ix + 93, 1 map. [Refs. in footnotes.] 1961. Rome. [Sales agent for U.K., H.M. Stationery Office.] [$1.0; 5s.]

The report is divided into five major sections. Section I is a review of present knowledge of food and nutrition in Africa south of the Sahara. It contains information on the main staples eaten in different areas, levels of consumption in terms of calories, proteins and fats, social and economic factors affecting nutrition, general nutritional status, population data, the limitations of survey data, and the extent of food and nutrition problems.

Section II which is headed "Practical Measures for Solving Food and Nutrition Problems" offers suggestions for improving animal production and the quality of livestock, for increasing fishing yields and freshwater fish supplies, and for replanning agricultural procedures to increase output and ensure greater yields of foods containing protein.

The importance of nutrition education at all levels is stressed and details are given for the implementation of effective programmes of nutrition education. The need for the training of suitable personnel for survey work and teaching was emphasized throughout the seminar. Section III deals specifically with the organization of programmes for training nutrition workers, from graduate specialists to educated lay people whose help may be enlisted in teaching campaigns, and section IV with details of the organization of nutrition surveys. It also contains suggestions for research into major nutritional problems. The improvement of nutrition by the coordination of various departments and services is discussed in section V.

There is an appendix which includes a list of the participants, details of techniques of food consumption surveys, and information on the evaluation of nutritional status together with a sample record card for rapid clinical survey. *Ruth Schwartz*

Food and Agriculture Organization of the United Nations. **FAO Nutrition Meetings Report Series No. 28. Report of the Technical Meeting on Nutrition in Food Policy and Planning in Asia and the Far East. Bangkok, Thailand, 6–13 June 1960.** pp. vi + 49. Rome: 1961. [Sales agent for U.K., H.M. Stationery Office.] [$0.50; 2s. 6d.]

The report is the result of a regional meeting for Asia and the Far East which was held in June 1960 in order to clarify the technical issues involved in food policies and planning, for individual governments in the area. Part I is an appraisal of the general situation with respect to food and nutrition. It contains such food consumption data as are available up to the present for the territories under discussion: India, Japan, Korea, Burma, Malaya, and the Philippines. While there were definite indications of improvements in recent years, notably in Japan, there were still many sections in which the

calorie intake was marginal or low, and throughout the area diets tended to be high in carbohydrates and restricted in variety. This was reflected in the incidence of deficiency diseases. Beriberi is still a problem in some areas where highly milled rice is the staple, and there were many accounts of protein malnutrition, frequently complicated by signs of vitamin A deficiency.

The remainder of the report is concerned with recommendations. On the whole, calorie deficiency was not regarded as a major defect. Improvements should be directed towards increased production of protective foods, especially foods of high protein content. Certain food targets were formulated in terms of the requirements of individual countries, but it was recognized that their attainment in the near future was unlikely. Suggestions were made therefore for the implementation of more modest intermediate improvements in relation to local conditions and the estimated rates of development of countries within the next 4–10 years. Consideration was given to the factors influencing levels of consumption and nutritional improvements, the place of nutrition in planning for development, and to the formulation of food policies and programmes. Finally, there is a section on the organization of nutrition services and their coordination with departments of health, agriculture, education, economics and social welfare. An Appendix gives an example of the formulation of intermediate term food consumption targets for a hypothetical country, typical for the region. *Ruth Schwartz*

ABRAMSON, J. H.; GAMPEL, B.; SLOME, C.; SCOTCH, N. **Sex Variation in the Nutritional State of Urban Zulu Adults. I. Weight, Skinfold Thickness, and Skin and Mucosal Lesions** [ABRAMSON, GAMPEL, SLOME & SCOTCH]. *Amer. J. Clin. Nutrition.* 1961, Mar.–Apr., v. 9, No. 2, 217–28. [36 refs.] **II. Serum Protein Levels and Prevalence of Edema** [GAMPEL, ABRAMSON, SLOME & SCOTCH]. *Ibid.*, 229–35. [27 refs.]

JELLIFFE, D. B., SYMONDS, B. E. R. & JELLIFFE, E. F. P. **Childhood Malnutrition and the Technical Development of Tropical Regions (a Note based on a Field Study in Southern Trinidad).** *Proc. Nutrition Soc. Southern Africa.* 1960, v. 1, 30–34.

See this *Bulletin*, 1961, v. 58, 621.

BADR EL-DIN, M. K. & ABOUL WAFA, M. H. **Galactose Intolerance in Kwashiorkor.** *J. Trop. Med. & Hyg.* 1961, May, v. 64, No. 5, 110–12, 1 fig.

This article concerns 10 Egyptian children varying in age between 7 months and 2 years who, after a prolonged period of being fed with starchy foods and little or no milk, suffered from kwashiorkor and presented with oedema and hair changes. These children were compared with normal infants in the same age-group in a galactose tolerance test. All of the children with kwashiorkor showed some galactose intolerance though they were still more capable of dealing with galactose than children with typical galactosaemia.

When the tests were repeated on 4 subjects with kwashiorkor, one week after they had started treatment with non-milk animal proteins, the results had returned to normal.

The importance of this investigation lies in the practical application to treatment. The authors suggest that the initial difficulties which are encountered when children with kwashiorkor are given dried milk may be due to their galactose intolerance. They found that milk is well tolerated when it is introduced after some days of giving the children non-milk animal protein.

H. Lehmann

CHIKHALIKAR, P., MAGAR, N. G., PATEL, J. C. & PATEL, B. D. **Observations on Serum Vitamin 'A' and Carotene Level in Normal and Malnourished Children.** *Indian J. Child Health.* 1961, Apr., v. 10, No. 4, 161–8. [13 refs.]

25 out of a total of 75 children seen in the out-patient department of a general hospital in Bombay showed clinical signs of vitamin A deficiency. The authors state that this was a typical sample and indicated an average incidence of vitamin A deficiency in about a third of the out-patients. The children belonged to the lower income groups, and most of those with signs of vitamin A deficiency suffered from multiple nutritional deficiencies.

Vitamin A and carotene were measured in the serum of these children and, in addition, in 25 in-patients with vitamin A deficiency. The average levels of carotene and vitamin A in the control group were 108·5 μgm. and 99·5 I.U. per 100 ml. respectively, the range being low to normal by English standards [*Bull. Hyg.*, 1949, v. 24, 458]. In the deficient group the average levels were 38·5 μgm. of carotene and 31·0 I.U. of vitamin A per 100 ml. The 25 in-patients were treated with 4–6 successive doses of 100,000 I.U. vitamin A which was given intramuscularly every 4 days. Serum vitamin A levels rose rapidly in the initial stages, but 4–5 injections were necessary to reach an average level of 99 I.U. per 100 ml. There was little effect on serum carotene levels.

Ruth Schwartz

GELFAND, M. & ALLCOCK, J. **Rickets in the African. Report of a Case.** *Central African J. of Med.* 1961, Apr., v. 7, No. 4, 129–32, 2 figs.

SPRUE

MOERTEL, C. G. & HARGRAVES, M. M. **Coexistence of Adenocarcinoma of the Jejunum and Nontropical Sprue.** *J. Amer. Med. Ass.* 1961, May 20, v. 176, No. 7, 612–14, 3 figs.

"Adenocarcinoma of the jejenum developed in a patient who had a 9-year history of steatorrhoea, and in whom the histopathological picture of nontropical sprue was seen. There is a possibility that the mucosal changes of nontropical sprue might predispose to neoplastic change."

HAEMATOLOGY

VELLA, F. & TAVARIA, D. **Haemoglobin Variants in Sarawak and North Borneo.** [Correspondence.] *Nature*. 1961, May 20, v. 190, 729–30.

Hitherto in the only report of a search for abnormal haemoglobin variants in Sarawak, only one such was found among 185 Dyaks, and this represented the heterozygous state for Hb E [this *Bulletin*, 1958, v. 55, 445]. The present authors, from the University of Malaya and from the General Hospital, Kuching, Sarawak, respectively, have examined 1,355 blood samples from Sarawak by paper electrophoresis at *p*H 8·6. These consisted of samples from 68 Sea Dyaks, 341 Land Dyaks, 742 Chinese, 166 Malays, 13 Indians, 23 Europeans, 1 Eurasian and 1 Filipino. They included hospital patients, antenatal cases and candidates for government employment and came largely from areas within reach of Kuching. Only Hb A was found except in (a) 5 Malays, 2 Chinese and 1 European, whose samples contained a mixture of Hb A and Hb E (the lineage of the European could not be traced, other than that she was English), and (b) 2 Chinese, whose samples contained a mixture of Hb A and a "slow" haemoglobin similar to Hb Q.

53 samples were also obtained from Muruts in North Borneo, who have been relatively isolated because until recently these tribes were head-hunters. Only Hb A was found in all but 3 samples and these 3 contained a mixture of Hb A and Hb E.

It would seem that abnormal haemoglobin variants are infrequent among the Dyaks. The presence of Hb E in 2 Chinese and 5 Malays conforms with similar findings in Singapore and Malaya [*ibid*., 1959, v. 56, (561), 650].

A haemoglobin, probably Hb Q, is evidently present among the Chinese in Kuching. *H. J. O'D. Burke-Gaffney*

GITHENS, J. H., KNOCK, H. K. & HATHAWAY, W. E. **Prevalence of Abnormal Hemoglobins in American Indian Children. Survey in the Rocky Mountain Area.** *J. Lab. & Clin. Med.* 1961, May, v. 57, No. 5, 755–8. [26 refs.]

"Hemoglobin electrophoretic analysis of 338 blood samples from American Indian children living in Wyoming and Montana revealed two specimens with hemoglobin D trait. Both of these children were in the same family and further study of their relatives uncovered a total of five cases of hemoglobin D trait. The parent with the hemoglobin D was of Ottawa Indian and French Canadian ancestry. No other abnormal hemoglobins were found. This study confirms the low incidence of abnormal hemoglobins previously noted in other American Indian tribes."

[See this *Bulletin*, 1959, v. 56, 651.]

KRAUS, A. P., KOCH, B. & BURCKETT, L. **Two Families showing Interaction of Haemoglobin C or Thalassaemia with High Foetal Haemoglobin in Adults.** *Brit. Med. J.* 1961, May 20, 1434–6, 2 figs. [19 refs.]

The "high foetal haemoglobin" gene was detected in 2 American Negro families, in 1 case segregating with Hb C and in the other with classical thalassaemia.

In the first family, a female aged 48 had only had symptoms referable to the haemoglobinopathy since the age of 35, when splenomegaly was found. The haemolysate contained 69% of Hb C and 31% of Hb F, and the haematological findings were compatible with Hb C disease. Only one parent could be tested, and she was a Hb C trait carrier. Of 12 siblings of the propositus, 2 were similar to the patient, 1 showed Hb AC, 7 were normal, and 2 showed no symptoms but carried 25% and 27% of Hb F respectively. 6 members of the next generation showed independent segregation of the two abnormal genes. In all subjects the Hb A_2 values were normal.

In the second family, a 26-year-old Negro had splenomegaly and attacks of left upper abdominal pain. He had a mild anaemia with target cells. His Hb F was 67·6%, his Hb A_2 3·4%, leaving 29% accounted as Hb A. Clinically his condition was not thalassaemia major, and of his parents only the mother showed thalassaemia minor, while the father showed Hb F 19·5% as an isolated abnormality. Of 3 siblings, 1 was normal, 1 had thalassaemia minor, and 1 (like the father) had 20% of Hb F [here the Table and family tree are contradictory, presumably a minor copying error]. The 2 abnormal genes of the propositus appeared separately in his 2 children by a normal wife, showing that for these genes he was doubly heterozygous.

[In the discussion of the second family it is assumed that both abnormalities lie in the β-chain locus. The propositus, however, was capable of forming 29% of Hb A, and therefore could form some normal β-chains. He could not therefore be doubly heterozygous for abnormalities at this locus. There are two possible explanations: (a) one of the mutations concerned was at the α-chain locus, or (b) there was indeed double heterozygosity, but the Hb A produced was in fact abnormal, containing the β-chains of thalassaemia, though the abnormality could not be demonstrated by the usual methods.]

Alan B. Raper

SWARUP, S., CHATTERJEA, J. B., HOSAIN, P. & HOSAIN, F. **A Comparative Study on Iron Turnovers with special reference to Hb E-Thalassaemia using small Doses of Fe59.** *Indian J. Med. Res.* 1961, Mar., v. 49, No. 2, 256–61, 1 graph. [13 refs.]

In 4 patients in Calcutta with haemoglobin-E-thalassaemia, the use of radioactive Fe demonstrated an increased plasma iron clearance and a decreased uptake of iron by erythrocytes. Ineffective erythropoiesis is therefore a factor in the anaemia of such patients, as it is in classical thalassaemia.

Alan B. Raper

SCHNEIDER, Rose G. & JIM, R. T. S. **A New Haemoglobin Variant (the 'Honolulu Type') in a Chinese.** [Correspondence.] *Nature.* 1961, Apr. 29, v. 190, 454–5, 2 figs.

A new haemoglobin variant, appearing together with Hb A, was found in a Chinese woman in Honolulu. There were no distinctive haematological findings. The new variant migrated on paper at *p*H 8·6 to a position between Hb's S and G, *i.e.* in the region of Hb's L [this *Bulletin*, 1957, v. 54, 1234],

P, and Stanleyville I [*ibid.*, 1960, v. 57, 67, 68]. On resin chromatography at *p*H 6 it was eluted slightly more rapidly than Hb S, thus differing from Hb L; and it separated from Hb A, thereby differing from Hb P. So far it resembled Hb Stanleyville I, but on free electrophoresis at *p*H 6·5 it did not separate from Hb A, and was therefore distinct from Hb Stanleyville I.

Alan B. Raper

SHIBATA, S., TAMURA, Akira, IUCHI, I. & TAKAHASHI, H. **Hemoglobin M_1: Demonstration of a New Abnormal Hemoglobin in Hereditary Nigremia.** Reprinted from *Acta Haematologica Japonica*. 1960, Feb., v. 23, No. 1, 96–105, 9 figs. [25 refs.]

"Hereditary nigremia", a dusky cyanosis without symptoms or other haematological changes, has been known in the Iwate Prefecture of Japan since 1951. It was thought to be caused by an abnormality of the porphyrin nuclei of haem, but the present paper establishes that it is, like haemoglobin M disease elsewhere, an anomaly of the molecular structure of globin.

To separate the abnormal from the normal pigments in trait carriers, it is necessary, as demonstrated by GERALD [*Blood*, 1958, v. 13, 936; this *Bulletin*, 1959, v. 56 (216)] to use methods other than paper electrophoresis; the present authors used agar-gel and resin chromatography. In agar gel with tris-borate buffer at *p*H 8·9 the natural haemoglobin separated into a greenish-brown and a red band, and similar separation was obtained when the haemolysate was oxidized with ferricyanide. The spectral absorption curve of the acid methaemoglobin from a whole haemolysate or from the dark band obtained on electrophoresis was different from that of normal acid met-Hb, lacking peaks at 630 and 500mμ, and depressions at 610 and 475mμ. The identity of the present Hb M with either of the variants found in America is not yet determined.

Alan B. Raper

MACIVER, J. E. & PARKER-WILLIAMS, E. J. **The Aplastic Crisis in Sickle-Cell Anaemia.** *Lancet*. 1961, May 20, 1086–9, 4 figs. (2 on pl.). [26 refs.]

Of the 3 types of "crisis" seen in sickle-cell anaemia, the authors, in their considerable experience, have never met one of the *hyperhaemolytic* type. They recognize the *painful* crisis, usually associated with infarcts. *Anaemic* crises fall into two groups. One, in infants under 2 years, is associated with megaloblastic disturbance of the bone marrow, and responds to folic acid; the second, usually in older children, and sometimes in several members of a family, is hypoplastic. 12 examples of the latter group are here reported. In only 2 was hypoplasia of the marrow demonstrated, changing to hyperplasia on the 3rd day, though because of the interruption of erythropoiesis it was several days before a reticulocytosis appeared in the blood. The other children, first seen at this later stage, were thought to have experienced the same initial hypoplasia.

The cause of such crises is thought to be infection, inducing temporary erythroid hypoplasia to an extent that would be negligible in a normal person, but is critical in one whose red cells have a greatly reduced life-span. In

this series, 7 of the cases occurred in 3 families, and another child developed unmistakable glandular fever during the recovery period. If the marrow can be shown to be active, a reticulocytosis will follow, and transfusion is unnecessary.

[See also this *Bulletin*, 1960, v. 57, 748] *Alan B. Raper*

VENOMS AND ANTIVENENES

ARNEIL, G. C. & MACLAURIN, J. C. **Case of Adder-Bite with Thrombosis of the Saphenous Vein.** [Memoranda.] *Brit. Med. J.* 1961, June 3, 1587–8, 1 fig.

On a summer's evening in 1960 a healthy boy aged 5 years in a remote part of Argyll, Scotland, was seen to have a painful, swollen, discoloured left ankle, flecked with blood. Within an hour he vomited and did so intermittently for 24 hours. Within 3 hours on the same night the discoloration had spread to the mid-thigh and the child was delirious and in great pain.

Next day he admitted to having been bitten by a snake, stated to be *Vipera berus*. He was given 100 mgm. hydrocortisone and sent to hospital 30 miles away. Here he was seen to be profoundly shocked, restless and with a persistent head-shaking movement, mentally confused and markedly dehydrated. The radial pulses and the blood pressure could not be recorded and the heart sounds were rapid and poor. The whole leg was grossly swollen, the skin was tense, mottled dark blue, purple and yellow, and showed a sharp demarcation line just below the inguinal ligament. Two small puncture wounds were seen on the ankle. No arterial pulse could be felt in the affected limb and the long saphenous vein was thrombosed. Treatment for shock, which is described, improved the general condition rapidly. 5 ml. of antivenene (which had now been obtained from Edinburgh) was infiltrated locally and another 5 ml. intramuscularly in the opposite thigh.

Next morning the patient was no longer shocked, but the mental confusion and pain persisted. The leg was enormously swollen and its circumference was little diminished by 2 injections of hyaluronidase. 72 hours after the bite the discoloration had crept along the inguinal ligament and the leg was cold. After much consideration, 5,000 units of chymotrypsin were given in the opposite thigh. Within 30 minutes a brisk reaction with mild shock occurred and lasted for an hour; swelling and discoloration spread up to the axilla; and the swelling in the leg decreased so that the femoral pulse became palpable within 12 hours.

The leg now improved, but the patient's condition deteriorated. The abdominal and thoracic walls were swollen and painful and by the 8th day an extensive pneumonia developed on the affected side. This responded to chloramphenicol and by the 17th day the boy was up and about.

The authors discuss adder bites, which are rarely dangerous to adults. In the present case delay aggravated the severity of the bite. The reaction from chymotrypsin suggested that venom may have been released from the tissues

and was still active. No further antivenene had been given because of the risk of anaphylaxis. The authors stress the important points made by MORTON [this *Bulletin*, 1961, v. 58, 121], MANSON-BAHR [*ibid.*, 1957, v. 54, 1460] and others and stress the need for antivenene to be available locally in rural areas where *V. berus* is present: in this case antivenene was only available on the second day. *H. J. O'D. Burke-Gaffney*

CAREY, J. E. & WRIGHT, E. A. **The Site of Action of the Venom of the Sea Snake** *Enhydrina schistosa*. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1961, Mar., v. 55, No. 2, 153–60, 2 figs. [12 refs.]

Dried sea-snake venom was separated into 2 fractions by dialysis and chromatography on cellulose columns. One fraction was equal in toxicity to the original venom when injected intraperitoneally into mice, but contained no lecithinase; the other had only 5% of the original toxicity to mice, but showed lecithinase activity equal to that of the crude venom.

The pharmacological effects of these fractions were studied in anaesthetized rabbits by injection into the medulla or into the femoral or vertebral artery. When injected into the medulla, crude venom and the lecithinase fraction caused stimulation followed by depression of respiration; the "toxic" fraction did not have this effect. However, neither fraction had any central activity when injected intra-arterially and the authors consider that central effects are unlikely to be caused by sea-snake bites. The venom caused local muscular paralysis when injected into the femoral artery; recovery took place after small doses, but large doses caused permanent muscle damage.

When tested upon the isolated phrenic-nerve-diaphragm preparation of the rat, the whole venom caused paralysis at concentrations of 0·1 to 3·5 μgm./ml. in the bathing fluid. Nerve conduction and the effect of direct electrical stimulation of the muscle were unimpaired and the site of action of the venom was therefore upon the neuromuscular junction. Contractions of the diaphragm caused by close injection of acetylcholine or of anticholinesterases were also inhibited by the venom, and the mode of action therefore differs from that of curare. [See also this *Bulletin*, 1960, v. 57, 749, (750).]

L. G. Goodwin

REID, H. A. **Myoglobinuria and Sea-Snake-Bite Poisoning.** *Brit. Mel. J.* 1961, May 6, 1284–9, 3 figs. [29 refs.]

The author provides convincing evidence that in sea-snake poisoning in human beings, the tissue primarily involved is skeletal muscle, especially certain muscles of the neck, trunk, and proximal limbs (pain on movement, stiffness, trismus). The pigment appearing in the urine is myoglobin and not haemoglobin; there is no notable haemolysis. The myocardium may also be affected and the kidneys and liver are usually involved. Nervous tissues are implicated late, possibly by a combination of direct toxic and secondary effects.

There is a remarkably constant latent period of 30–60 minutes after the bite before signs of envenomation develop. This suggests that the absorption

of the venom follows diffusion along the interstitial tissues to the capillaries and lymphatics, thence *via* the pulmonary to the systemic circulation. The author suggests that the venom affects skeletal muscles "according to blood flow and anatomical propinquity to the pump. Thus it is that the throat, neck, back, or proximal limb muscles are the first to show the characteristic stiffness and muscle-movement pains".

The assumption from previous animal experiments has been that sea-snake venom is predominantly neurotoxic. The author considers that in human subjects this is not the case, the venom acting primarily on skeletal muscle cells. This view is supported by the following points. Muscle-movement pains precede paralysis by several hours in fatal cases and by longer in non-fatal severe poisoning. The paresis in individual patients is often apparent rather than real. Trismus is a common sign but, unlike this phenomenon in tetanus, the jaw jerk is absent or sluggish in sea-snake poisoning and the spasm can be reduced by sustained pressure on the jaw. This suggests that the trismus may in fact arise from "splinting reaction of intact muscle cells". No fibrillation or fasciculation is seen in poisoning, and the faradic and galvanic responses are qualitatively unchanged (typical of a myopathic lesion). Again, myoglobin may appear in the urine before paresis develops and in mild cases may be present without development of paresis. Necropsy shows widespread myonecrosis even a few hours after the bite. Finally, there is no clinical or pathological evidence of sensory, cerebellar or meningeal involvement.

The flaccid paresis which develops can best be explained by progressively increasing muscular damage. The evidence suggests failure of the end plate at the myoneural junction.

No histological abnormalities were found in smooth muscle or in the myocardium. In several cases the ECG showed right ventricular dominance, without clinical or radiological evidence of pulmonary vasoconstriction. Hyperkalaemia occurred in 3 fatal cases and may have been concerned in the late-developing paresis.

In the 38 cases reviewed between 1957 and 1959, only 9 were serious (5 fatal, 3 severe, 1 moderate). Case notes are given of 2 fatal cases, one severe poisoning and one moderate.

Myoglobin was found in the urine of all the serious cases. In one fatal case the pigment appeared within 3 hours after the bite. There was moderate leucocytosis, the degree corresponding with the severity of the poisoning. There was evidence of renal damage in 3 cases.

[This is a further and most important contribution to the knowledge of snake bite by an author who has already brought a new and exciting approach to the subject. It must be read in full.] *B. G. Maegraith*

MARSDEN, A. T. H. & REID, H. A. **Pathology of Sea-Snake Poisoning.** *Brit. Med. J.* 1961, May 6, 1290–93, 5 figs. [19 refs.]

The material examined was obtained by biopsy from one patient who recovered from severe poisoning, and from autopsy of 7 patients.

Macroscopic changes at autopsy were few. Most had brown urine in the bladder. [No further information is given about the urine.]

There was widespread hyaline necrosis in the skeletal muscles. Individual muscle fibres were picked out and the number of fibres affected varied from muscle to muscle. The segment of the muscle fibre affected was swollen and in the advanced state both nuclei and myofibrils were fused into an amorphous hyaline mass; the necrotic material was contracted in places leaving an empty space beneath the sarcolemma. Regeneration and repair began one to two weeks after the bite. Repair was remarkably complete. Only fine scarring was detected in the second biopsy taken from the deltoid in a patient 6 months after the injury.

Distal tubular necrosis was present in the kidneys of all patients surviving for more than 48 hours. In the earlier stages the kidneys were congested, particularly at the boundary zone. This picture was associated clinically with acute renal failure. The pattern in other organs was irregular. Centrilobular degeneration with cellular infiltration of the portal areas was present in some patients.

The pathogenesis of the lesions is briefly discussed. The principal lesion of sea-snake poisoning was necrosis of the skeletal muscles. The renal damage was similar to that described in other forms of myonecrosis. No histological changes were seen in the nervous system.

The authors point out that in previous communications myonecrosis was not described in animals killed by *Enhydrina schistosa* venom [this *Bulletin*, 1960, v. 57, 749]. Fresh venom and reconstituted dried venom was injected into dogs. Widespread myonecrosis was found in each case, suggesting that it must have been overlooked in the former experiments.

[This paper should be read as a successor to the clinical report by Reid (above). It is unfortunate that the case numbers do not exactly coincide in the two papers (Case 4, for example). It would have been useful if the authors could have indicated specifically the snake most likely to have been involved in the envenomations described. The reviewer presumes it was probably *E. schistosa*.] *B. G. Maegraith*

Strover, H. M. **Snakebite and its Treatment.** *Central African J. of Med.* 1961, Mar., v. 7, No. 3, 84–7.

The author lists the main families of snakes found in Rhodesia. He discusses first-aid treatment which, in the case of poisonous snake bite, includes immobilization, the application of a tourniquet, injection of antivenene, incision and lavage of the wound with permanganate solution (never crystals). He advises a tourniquet tight enough to restrict arterial circulation, eased for 1–2 minutes every 20 minutes, and discontinued after the administration of serum. Treatment in hospital should include continuance of antivenene therapy where necessary and the intravenous administration of calcium gluconate in the case of viper envenomation. The effects of the bites of certain snakes, including *Bitis arietans*, *Naja* spp., *Dendroaspis* spp. and *Dispholidus typus* are described. Case histories are given.

[Although the use of antivenene is freely advocated the author makes no reference to the hazards of serum sensitivity.

The first-aid procedures recommended in snake bite differ considerably

from author to author. It is time some new and reasonably authoritative assessment was made concerning the general principles involved and their application in envenomation by individual species of snake.]

B. G. Maegraith

YA, P. M., GUZMAN, T. & PERRY, J. F., Jr. **Treatment of Bites of North American Pit Vipers.** *Southern Med. J.* 1961, Feb., v. 54, No. 2, 134–6.

The best method of treatment of rattlesnake bite is still a matter of controversy [see below].

The authors have studied the effects of various procedures on groups of dogs anaesthetized with pentobarbitone and injected intramuscularly with a lethal dose (8 mgm./kgm.) of *Crotalus adamanteus* venom.

If a tourniquet was applied to impede lymph flow, and incision and suction carried out immediately and continued for ½ to 6 hours, 25 to 54% of the dogs survived. Severe necrosis always developed at the site of injection. If incision and suction were delayed for 30 minutes there were no survivors.

Application of a tight tourniquet to occlude blood flow, followed by cooling of the limb in ice, was also ineffective. Dogs treated in this way and which survived smaller doses of venom (5 mgm./kgm.) suffered very severe necrosis of the tissues. Similar treatment, with cooling for 8 hours followed by an injection of antivenene sufficient to neutralize half of the original dose of venom, resulted in the survival of 6 of 8 dogs, but tissue damage was severe.

Dogs to which the tourniquet was applied loosely to impede lymph flow and which were given an injection of antivenene half an hour after the venom, survived with little or no tissue damage.

Although incision and suction are shown to have some value if carried out immediately, the authors think that the method should only be used if antivenene is not available for many hours. The proper treatment of rattlesnake bite is to inject antivenene as soon as possible. *L. G. Goodwin*

RUSSELL, F. E. & EMERY, J. A. **Incision and Suction following Injection of Rattlesnake Venom.** *Amer. J. Med. Sci.* 1961, Feb., v. 241, No. 2, 160–66, 1 fig. [14 refs.]

The beneficial or injurious results of the incision and suction of rattlesnake bites are still a matter for controversy [see above]. From their experience [see for example this *Bulletin*, 1960, v. 57, 633], the authors consider that if the victim is a child or the snake a large one and if incision through the fang-marks can be made within an hour, the treatment is of value.

In this paper they describe experiments with rabbits which were immobilized and injected intramuscularly with a dose of *Crotalus adamanteus* or *C. atrox* venom equivalent to 3 times the median lethal dose. Within 2 minutes the site was incised and suction applied with a Cutter rubber suction-cup. The haemorrhagic exudate was collected at 5-minute intervals, and injected intravenously into rabbits anaesthetized with pentobarbitone. Control samples from an area injected with saline showed no activity, and very little effect

was produced by exudate collected between 1 and 2 hours after injection of venom. Samples collected during the first hour after injection of venom caused an immediate fall of arterial blood pressure and a rise of venous and cisternal pressures; the recipient rabbits died. Post-mortem examination showed lesions similar to those caused by the original venom. Changes in the electrocardiogram were variable; the electroencephalogram showed depressed electrical activity, associated with the fall in blood pressure.

Early incision and suction therefore removes a substance similar to the original venom from the area of the bite and if carried out should increase the chance of survival of the victim. As a criticism of laboratory experiments by other workers, the authors note that incision without an anaesthetic causes pain and may bring into play physiological processes which render the animal more sensitive to the effects of the venom. In man the operation is, by contrast, relatively trivial and arguments based upon the results of such animal experiments must be applied with caution to human medicine.

L. G. Goodwin

WIENER, S. **Snake Bite in a Subject Actively Immunized against Snake Venom.** *Med. J. Australia.* 1961, May 6, v. 1, No. 18, 658–9.

"A case of spontaneous recovery from the bite of a tiger-snake in a subject actively immunized against tiger-snake venom is presented.

"No generalized toxic effects occurred.

"Since the titre of circulating antivenene before the bite was 0·5 unit per millilitre, it is estimated that at the time of the bite the patient could tolerate at least 17 mg. of venom.

"From the local effects and the rise in the antivenene titre which followed the bite, it is inferred that venom was injected by the snake at the time of the bite."

[See this *Bulletin,* 1961, v. 58, 371.]

OKONOGI, T., HOSHI, S., HONMA, M., SASAMOTO, K., AOKI, K., MITSUHASHI, S., MAENO, H. & SAWAI, Y. **Studies on the *Habu* Snake Venom. III—(1) Local Histopathological Changes following Inoculation of the *Habu* Snake Venom.** *Japanese J. Microbiol.* 1959, Oct., v. 3, No. 4, 499–507, 8 figs. [12 refs.]

In treatment of *Trimeresurus* bite the general and local effects of the venom have both to be considered. Antivenene is very effective against absorbed venom so far as life saving is concerned, but the local effects are very serious and maiming.

The authors have studied the local effects of the venom in guineapigs and rabbits. Intracutaneous injection of pooled venom leads to extensive local haemorrhage; intramuscular injection leads to severe haemorrhage and muscle necrosis. Both effects develop rapidly, reaching their maximum within 4 hours. In human injury secondary infection commonly aggravates these effects. Large volumes of antivenene are needed to neutralize the myolytic action of the proteinases of the venom. Metallic manganese is

involved in the myolysis and can be chelated by ethylenediamine tetra-acetic acid. The authors suggest the use of the latter for first-aid. [See also this *Bulletin*, 1961, v. 58, 251.] *B. G. Maegraith*

KUBO, T., KUNITA, N. & AMANO, T. **An *in vitro* Assay Method for "Mamushi" Antivenin Sera.** *Biken's J.* Osaka. 1960, Dec., v. 3, No. 4, 329–38, 4 figs. [10 refs.]

SAUNDERS, P. R. **Pharmacological and Chemical Studies of the Venom of the Stonefish (Genus *Synanceja*) and other Scorpionfishes.** *Ann. New York Acad. Sci.* 1960, Nov. 17, v. 90, Art. 3, 798–804, 2 figs. [23 refs.]

LANE, C. E. **The Toxin of *Physalia* Nematocysts.** *Ann. New York Acad. Sci.* 1960, Nov. 17, v. 90, Art. 3, 742–50, 5 figs.

SOUTHCOTT, R. V. **Red-Back Spider Bite (Latrodectism) with Response to Antivenene Therapy given Eighty Hours after the Injury.** *Med. J. Australia.* 1961, May 6, v. 1, No. 18, 659–62. [21 refs.]

"A case is recorded of a patient with typical symptoms from red-back spider (*Latrodectus hasseltii*, Thorell) bite with response to antivenene therapy given 80 hours after the bite. The symptoms disappeared over a period of six hours. It is concluded that this therapy may be effective if given up to 80 hours after the infliction of a bite."

[See this *Bulletin*, 1956, v. 53, 1273; 1957, v. 54, 83.]

MCGOVERN, J. P., BARKIN, G. D., MCELHENNEY, T. R. & WENDE, R. *Megalopyge opercularis.* **Observations of its Life History, Natural History of its Sting in Man, and Report of an Epidemic.** *J. Amer. Med. Ass.* 1961, Apr. 1, v. 175, No. 13, 1155–8, 4 figs. [11 refs.]

The "puss caterpillar" mature larval stages of the "flannel" moth *Megalopyge opercularis* are found from Maryland to Mexico. They may sometimes constitute a public health problem because of their toxic effects in contact with the human skin. The hairs of the dorsal surface of the larva are hollow and easily broken. Intoxication results from brushing against the larva or from handling it.

The authors collected information regarding 2,130 cases of stinging. Contact is followed rapidly by local burning pain which may radiate widely, local swelling and peripheral oedema, and haemorrhagic spots at the points of penetration of the hairs, sometimes forming a grid-like pattern. There may be a radiating lymphangitis, and the glands draining the sting area are enlarged in one-third of the victims. Headache develops in minutes after the stinging and may be accompanied by malaise, nausea and vomiting. Some degree of shock is common within a few hours of the sting; occasionally

there may be convulsions or semi-coma. In the present epidemic there were no deaths.

It is believed that the toxin concerned may be protein in nature but there is no firm information. The authors believe that all larval stages may be capable of producing reactions, the effectiveness of the sting depending on the maturity of the larva, number of spines, the degree of pressure exerted on the caterpillar and the type and thickness of the skin exposed.

Scotch tape applied lightly over the sting area and then removed is effective in withdrawing broken off spines. Early local application of ice relieves pain. The value of antihistamines is questionable, but adrenaline may be useful. General reactions may respond to intravenous calcium gluconate. Meperidine, codeine or morphine may be needed.

[See also this *Bulletin*, 1943, v. 40, 181 ; 1952, v. 49, 1073.]

B. G. Maegraith

TOXOPLASMOSIS

Pande, P. G., Shukla, R. R. & Sekariah, P. C. **A Heteroglycan from** *Toxoplasma gondii*. [Correspondence.] *Nature*. 1961, May 13, v. 190, 644–45.

Earlier work [this *Bulletin*, 1958, v. 55, 693 ; 1959, v. 56, (769)] has indicated that the antibodies taking part in the complement-fixation, dye and haemagglutination tests in toxoplasmosis were associated with the protein fraction of the parasite. The present authors have isolated a polysaccharide fraction from pure suspensions of the RH strain of *Toxoplasma gondii* obtained from peritoneal exudates of infected mice. The organisms were first lysed by distilled water and after centrifugation the extract was made isotonic with saline and the soluble carbohydrate precipitated by *iso*-propanol. It appeared to be homogeneous as indicated by electrophoretic and sedimentation studies after being rendered protein-free. Nucleic acid or lipid was not detected. By agar diffusion experiments only a single line of precipitation was produced by homologous antiserum. Chromatography indicated that glucose, glucosamine and an unidentified pentose were among the carbohydrate constituents but not uronic acid. Some details are given of the antigenic characters of this polysaccharide. When used as a vaccine it was non-protective for mice against the homologous infection as was the corresponding antiserum.

J. D. Fulton

Bergamaschi, P. Sul significato clinico delle prove sierologiche per la toxoplasmosi in gravidanza: indagini su 110 gravide. [**Clinical Significance of Serological Tests for Toxoplasmosis in Pregnancy: Examination of 110 Cases**] *Parassitologia*. Rome. 1960, Apr.–Aug., v. 2, Nos. 1/2, 35–46. [19 refs.] English summary (4 lines).

The author carried out comparative examinations of the sera of 110 pregnant patients from the Obstetric and Gynaecological Clinic of the University of Pavia, by the dye test (DT) and complement-fixation test (CFT).

The patients were divided into 2 groups: (a) 68 with pathological obstetrical conditions and (b) 42 normal cases which served as controls.

The results obtained in the first group were as follows:

Condition	No. of patients	Dye test positive	CFT positive
Repeated abortion	38	31	16
Abortion in primigravidae	8	6	2
Premature births with dead or non-viable foetus	12	9	3
Stillbirths or malformations	10	7	1

Titres were variable, but in the dye test, titres up to 1 in 2,000 were found and in many, especially in the first group, the evidence suggested acute toxoplasmosis.

The control group showed positive reactions chiefly with DT, but the titres were too low to be of any significance. *C. A. Hoare*

De Vries, S. I. Glandulaire toxoplasmose. [**Glandular Toxoplasmosis**] *Nederl. Tijdschr. v. Geneesk.* 1961, Apr. 29, v. 105, No. 17, 816–19. [13 refs.]

The English summary appended to the paper is as follows:—

"A glandular form of toxoplasmosis is described in 6 patients; its frequency is pointed out. The disease is usually diagnosed as infectious mononucleosis or as a malignant lymphoma; in the latter case patients have been erroneously treated with X-rays or cytostatic agents. Serologic tests for toxoplasmosis should be performed in all cases of suspected infectious mononucleosis with a negative Paul-Bunnell test, as well as swelling of the lymph glands with obscure cytologic or histologic data."

[See this *Bulletin*, 1958, v. 55, 1376.]

Kulasiri, C. & Prasad, H. **A Note on the Behaviour of an Avirulent Strain of *Toxoplasma gondii* in some B-Vitamin Deficient Chicks.** *Parasitology.* 1961, May, v. 51, Nos. 1/2, 265–7.

"No differences in susceptibility or parasite distribution of avirulent *Toxoplasma* was observed between biotin-, pantothenic acid-, nicotinic acid-, riboflavin- and heat-labile vitamins-deficient chicks and their controls. Ordinary diet supplemented with cod-liver oil did not have any effect either. Avirulent *Toxoplasma* were readily isolated from the brains of all the animals at the end of 1 month."

DERMATOLOGY AND FUNGUS DISEASES

McDonough, E. S., Ajello, L., Ausherman, R. J., Balows, A., McClellan, J. T. & Brinkman, Sherry. **Human Pathogenic Fungi recovered from Soil in an Area Endemic for North American Blastomycosis.** *Amer. J. Hyg.* 1961, Jan., v. 73, No. 1, 75–83, 1 pl. [27 refs.]

842 soil and other samples were collected over a period of 16 months in the Lexington area of Kentucky in a search for reservoirs of the causal organism of North American blastomycosis, *Blastomyces dermatitidis*. This area is noted for its high incidence of human and canine blastomycosis.

Various methods of isolation were employed and resulted in the collection of different groups of organisms. Thus, intraperitoneal injection of mice with soil suspensions, and subsequent planting out of their viscera on culture media gave: *Allescheria boydii, Cryptococcus neoformans* and *Histoplasma capsulatum*; hair-baited soil in Petri dishes gave *Microsporum gypseum, M. cookei* and *Keratinomyces ajelloi,* whereas soil only in Petri dishes incubated at 37°C. gave *A. boydii, Candida albicans* and *M. gypseum.*

B. dermatitidis was isolated from only one of the various samples and this isolate is to be the subject of a future report. *H. capsulatum* was isolated from several types of sample including chicken-house soil, dog-pen soil, human manure and wood (origin not specified). *C. albicans* was isolated only once: from a chicken coop. *C. neoformans* was isolated from chicken-house soil, tobacco-barn soil and wood from a chicken-house. *M. gypseum, M. cookei* and *K. ajelloi* were isolated from a number of the sites from which samples were obtained.

The possibility that the "mouse technique" was not adequate for isolating *B. dermatitidis* was eliminated by the successful results of experiments in which soil seeded with this organism was tested by this technique. It is thought that perhaps persistent sampling throughout the year might provide the desired result. *C. J. La Touche*

Mackinnon, J. E., Conti-Diaz, I. A., Yarzábal, L. A. & Tavella, N. Temperatura ambiental y blastomicosis sudamericana. [**Ambient Temperature and South American Blastomycosis**] *An. Facul. de Med. Montevideo.* 1960, v. 45, Nos. 5/6, 310–18. English summary.

Previous experiments in guineapigs, rabbits and mice [this *Bulletin,* 1960, v. 57, 293, 407, 640] suggested that the outcome of inoculating *Paracoccidioides brasiliensis* into these animals might to some extent be governed by the temperature at which they were kept and that the localization of the lesions might be dependent on the temperature at different sites in the animals. To test this hypothesis the following experiments were conducted.

1. The effects of temperatures between 32° and 40°C. on the growth of *P. brasiliensis in vitro* were studied. The best growth of the yeast phase was found to occur between 32° and 35°C. At 39°C. practically no growth occurred in nutrient broth with 1% glucose and 20% horse serum at *p*H 7·1.

2. The temperatures of different parts of the bodies of groups of guineapigs kept at different ambient temperatures were recorded. The mean temperature of the animals in an ambient of 15–16°C. varied from a minimum of

24·1°C. (forefoot), through 26·8°C. (muzzle), 31·7°C. (foreleg), 33·7°C. (eyelids), 35·8°C. (perianal tissues), 36·2°C. (rectum) to a maximum of 38°C. in the intestines; animals kept at 37°C. showed a much narrower spread, the temperatures ranging from 38·5°C. in the forefoot to 40·6°C. in the intestines.

3. Groups of guineapigs were given a standard intracardiac dose of *P. brasiliensis* (0·5 ml. of yeast suspension of turbidity No. 7 on the MacFarland scale) and kept at temperatures ranging from 5°C. to 37°C. Animals kept at 5°–9°C. developed intense lesions of the eyelids and muzzle and usually also of the testis, eyes and some skeletal muscles—especially those of the lumbar region and buttocks while the diaphragm and psoas remained largely unaffected; the lesions were evolutive. At temperatures of 14°C.–30°C. the skeletal muscles did not show lesions but lesions did develop on the skin of eyelids, muzzle and perigenital area and occasionally in rectum and testis; skin lesions developed less readily at 28°–30°C. than at 14°–20°C. and frequently healed spontaneously after 4 weeks. The skin lesions developed in animals kept at 14°–20°C. healed rapidly when the temperature was raised to 37°C. No lesions developed in animals maintained at 37°C. throughout.

These findings are of the greatest interest and obviously have considerable bearing on the epidemiology, and possibly also on the therapy, of this disease.

Ian G. Murray

Del Negro, G., Wajchenberg, B. L., Pereira, V. G., Shnaider, J., Cintra, A. B. de U., De Assis, L. M. & Sampaio, S. A. P. **Addison's Disease associated with South American Blastomycosis.** *Ann. Internat. Med.* 1961, Feb., v. 54, No. 2, 189–97, 2 figs. [35 refs.]

The authors describe the clinical course in 3 cases of South American blastomycosis in which Addison's disease developed as a complication.

Previous literature had revealed that in patients suffering from South American blastomycosis the adrenals had become involved [this *Bulletin*, 1952, v. 49, 720], and that in some of these patients the symptoms and signs of Addison's disease had become manifest.

In all 3 cases described by the authors the patients concerned presented at first with oral lesions diagnosed as those of South American blastomycosis. They were all accordingly treated with sulphadiazine, with good results. Addison's disease was diagnosed in all 3 patients some years after the original diagnosis of South American blastomycosis had been made. All 3 patients responded well to therapy with oral prednisone and intramuscular desoxycorticosterone acetate, and, as 2 of them still exhibited signs of recurrent South American blastomycosis, this treatment for Addison's disease was supplemented by treatment directed at controlling the former infection.

C. J. La Touche

Breslau, A. M., Hensley, T. J. & Erickson, J. O. **Electron Microscopy of Cultured Spherules of** *Coccidioides immitis*. *J. Biophysic. & Biochem. Cytol.* Baltimore. 1961, Mar., v. 9, No. 3, 627–37, 10 figs. [23 refs.]

TROPICAL OPHTHALMOLOGY

PINTUS, L. & LATTE, B. Stato attuale di diffusione del tracoma della Provincia di Nuoro con particolare riguardo alla popolazione scolastica. [**Present State of Trachoma Incidence in the Province of Nuoro with special reference to School Population**] *Igiene Moderna.* 1960, v. 53, Nos. 9/10, 527–51, 3 graphs (1 on folding pl.) [26 refs.] English summary.

Much of this province is mountainous or hilly, and lies in the eastern part of Sardinia. Population exceeds one-quarter of a million and many are more or less illiterate. In spite of recent improvements, environmental conditions and services remain at a low level and half the inhabitants enjoy neither a potable water supply nor proper sanitation. A large proportion are self-employed at agricultural and pastoral pursuits and are poor. In the mountains, many are nomads. Much housing remains primitive and is overcrowded.

In the school year 1959–60 the authors examined 31,878 schoolchildren in 102 towns and other districts and found that 2,394, or 7·5% were suffering from trachoma, over half of these being in the first or "initial" stage, by MacCallan's scheme of classification. Few showed any discharges or corneal complications and the lesions had a benign character and healed without leaving permanent damage. The incidence was highest among the younger children.

A survey of schoolchildren in 1957–58 had shown a trachoma index of 8·49% in Nuoro Province and 4·49% for the whole of Sardinia.

The endemic picture has been improving, with fewer cases and increased mildness, as a result of mass treatment but the trachoma service still has various shortcomings which the authors refer to. Control measures are obviously less easily applied to the adult population. *J. Cauchi*

See also p. 1056, LAPA [**Ocular Onchocerciasis in Angola**].

TROPICAL ENVIRONMENTAL CONDITIONS

PEEL, C. **Thermal Comfort Zones in Northern Nigeria. An Investigation into the Physiological Reactions of Nursing Students to their Thermal Environment.** *J. Trop. Med. & Hyg.* 1961, May, v. 64, No. 5, 113–21, 1 fig. [18 refs.]

TENNENBAUM, J., SOHAR, E., ADAR, R. & GILAT, T. [**The Physiological Significance of the Cumulative Discomfort Index (Cum. D.I.)**] *Harefuah.* Jerusalem. 1961, May 15, v. 60, No. 10, [in Hebrew 315–19, 1 fig. & 4 charts. English summary 319].

The English summary appended to the paper is as follows:—

"During an experimental march from Eilat to Metulah a good correlation was noted between the Cumulative Discomfort Index (Cum. D. I.) for 4

hours, and the Cum. D. I. during effort on the one hand, and the volumes of sweat secreted during the respective periods, on the other hand. This fact establishes the physiological significance of the Cum. D. I. as an index of environment heat load, because the rate of sweating may be considered as the best indicator of physiological response to the total heat load of the environment.

"From the data gathered a monogram was drawn from which the expected loss of fluid can be derived for a given effort and varying heat loads as expressed by the Cumulative Discomfort Index."

SOHAR, E., ADAR, R. & HERSHCO, A. [**Voluntary Sodium Intake during Effort in Hot Environments**] *Harefuah*. Jerusalem. 1961, May 15, v. 60, No. 10, [in Hebrew 334–7. (10 refs.) English summary 337].

The English summary appended to the paper is as follows:—

"The amount of salt added by 10 young men as condiment to their food was measured during an experimental march from Eilat to Metulah. The voluntary salt intake contributes an average of only 4·7% of the total daily sodium intake in an ordinary Western-type diet.

"No correlation was found between *voluntary* sodium intake and the *total* sodium intake, urinary sodium excretion or environmental heat load.

"Voluntary salt intake is determined mainly by personal food habits, and may be modified to some extent by external factors such as the taste of the food or persuasion. Salt appetite is not to be equated with salt requirement."

SOHAR, E., ADAR, R., TENNENBAUM, J. & KESTEN, M. [**Intake and Urinary Excretion of Sodium Chloride under Varying Conditions of Effort and Environmental Heat**] *Harefuah*. Jerusalem. 1961, May 15, v. 60, No. 10, [in Hebrew 326–32. (28 refs.) English summary 332].

The English summary appended to the paper is as follows:—

"The sodium intake and the urinary excretion were recorded in an experimental march from Eilat to Metulah during August 1959 by 10 young men and in 10 naturopaths living near Safad in August 1960. Sodium excretion was determined also in workmen in Eilat and in men working in the engine rooms of a ship at sea.

"During the experimental march the men were free to take water, food and salt as they pleased, and their diet was similar to the average normal diet of the population. No clinical or laboratory signs of salt depletion were observed though the men perspired at the rate of 5·5–10·3 litres per 24 hours.

"The average intake was 6·0 gm. sodium (equivalent to 15 gm., sodium chloride) per day, and the average daily urinary excretion was 4 gm. sodium (10 gm. sodium chloride). The difference between intake and urinary excretion is accounted for by losses of sodium in the sweat and by changes in the volume of the extracellular fluid which are caused by fluctuations of the environmental heat load. On the average, 82·9% of the total intake of sodium

was derived from the food, 12·4% from water and other beverages, and only 4·7% from the salt added as condiment to the food.

"No correlation was found between sodium intake and the external heat load or the volume of sweat secreted.

"Thirty-five workmen who were engaged in hard physical labor under climatic conditions that prevail in Eilat in August, and who ate average diets, excreted an average of 3·19 gm. sodium (8 gm. sodium chloride) per 24 hours.

"Nine men working in shifts in the engine-rooms of a ship at sea, also ate average diets, and were doing work that was not so strenuous. They were subjected, however, to extreme external heat loads—the cumulative discomfort index for 24 hours was twice that of a hot summer day in Eilat. Their average urinary excretion was 2·35 gm. sodium (6 gm. sodium chloride) per day.

"Ten naturopaths living in a small village near Safad, enjoyed comfortable weather (cumulative discomfort index about $\frac{1}{3}$–$\frac{1}{4}$ of that in Eilat), and did light to moderate work. Because of their food habits their average sodium intake was as low as 0·8 gm. per day, and half of this, on the average, was excreted in the urine each day.

"No clinical signs or symptoms, that could have been interpreted as being caused by salt deficiency, were noted in any of these groups. The various combinations of work, heat load, and sodium intake observed in the 4 groups may be taken as representative of the population in this country. It may be concluded that for a population living on a normal diet no danger of salt depletion exists during the summer in Israel. On the other hand, when fluid is restricted, acute hypernatremia may develop after losing large amounts of sweat. The addition of salt to the daily diet as sodium chloride tablets or saline is superfluous and may be harmful."

SOHAR, E., ADAR, R., GILAT, T., TENNENBAUM, J. & NIR, M. **[Reduction of Voluntary Dehydration during Effort in Hot Environments]** *Harefuah*. Jerusalem. 1961, May 15, v. 60, No. 10, [in Hebrew 319–22. English summary 322–3].

The English summary appended to the paper is as follows:—

"In an experimental march from Eilat to Metulah an effort was made to maintain positive daily fluid balance, and to prevent voluntary dehydration during effort. A positive daily fluid balance was achieved by means of a plentiful supply of cold drinks during and between meals, at all hours of the day.

"The prevention of voluntary dehydration during effort was achieved by supplying suitable drinks cooled to a temperature of 15–20°C. The type of beverage favored by men under a considerable effort in a hot environment was a cold, sweetened, fruit flavored drink. Gaseous drinks, beer and milk were not suitable for drinking in large amounts during effort.

"A further means of reducing voluntary dehydration during effort was to space the rest periods so that instead of marching 50 minutes and resting 10 each hour, the men continued the march for 90–120 minutes, and were thus able to rest for 15–20 minutes and spend more time drinking. The importance of preventing voluntary dehydration is discussed."

ADAR, R., TENNENBAUM, J., LENZ, R. & SOHAR, E. **[Dehydration and Urinary *p*H]** *Harefuah*. Jerusalem. 1961, May 15, v. 60, No. 10, [in Hebrew 323–5. English summary 325.]

The English summary appended to the paper is as follows:—

"Changes in urinary pH were measured during an experimental march by 10 men from Eilat to Metulah during August 1959. Only minor fluctuations were noted in the urinary pH and these were in no way correlated with the varying degrees of dehydration (up to 6% of body weight) which occurred during the period of effort. There were only small differences in the state of hydration from day to day, and these were not related to the minimal changes in the average pH of the morning urine on the respective days.

"No correlation was found between changes in urinary pH and between the volume of urine excreted, the concentration of sodium, potassium and chloride in the urine, the volume of sweat excreted, changes in rectal temperature, and the varying external heat load.

"These results tend to discredit the theory that the increased occurrence of uric acid stones which is reported in Israel is due to decrease in urinary pH caused by dehydration."

CONSOLAZIO, C. F., SHAPIRO, R., MASTERSON, J. E. & MCKINZIE, P. S. L. **Energy Requirements of Men in Extreme Heat.** *J. Nutrition*. 1961, Feb., v. 73, No. 2, 126–34. [21 refs.]

From a preliminary study it had appeared that the daily energy requirements of troops living and working in the desert were increased by exposure to high temperatures or intense solar radiation. The study described in the present paper was designed to check that finding. It was carried out in the desert heat of Yuma, Arizona, where the effects of heat on the energy requirements of men performing a constant daily round of activity were evaluated from daily measurements of energy expenditure and energy balance, fluid and nitrogen balances, rates of sweating, changes of body temperature and of weight, and changes in body composition.

The subjects were 8 normal healthy young men, and they were studied over 3 10-day experimental periods. Throughout they lived in air-conditioned barracks from 5 p.m. to 7 a.m. The daytime exposures in the 3 periods are referred to as "hot sun", "hot shade", and "cool shade" respectively. The daylight temperatures averaged 40·5°C. (104·9°F.) and 40·3°C. (104·5°F.) in the first two periods, and 26°C. (78·8°F.) for the cool shade. Food and water were allowed *ad libitum*.

The energy cost of the various daily activities was measured morning and afternoon by indirect calorimetry, and diaries were kept to provide records of evening activities. Total daily energy expenditures were calculated from these records and the measured daytime energy expenditure.

From their data the authors conclude that there is an increased calorie requirement when men live and work in extreme heat. They observed significant increases in food consumption, and the actual calorie requirements, calculated by allowing for changes in body composition, were even greater.

The differences between the energy costs of the various forms of activity in the hot conditions (sun or shade) and in the cool shade were significant. After adjustment for changes in body composition the average energy requirements per kgm. of body weight during the periods of exposure to hot sun, hot shade and cool shade were 55·5, 56·4 and 36·6 cal. respectively.

It is thought that the increased requirements in the heat were due to the effects of increased circulatory activity and increased activity of the sweat glands as well as to an increased metabolic rate due to the elevation of body temperature. *Thomas Bedford*

SHIBOLET, S., BANK, H., GILAT, T., HULER, T. & FISCHER, S. **[Severe Fibrinolysis in Fatal Heatstroke]** *Harefuah*. Jerusalem. 1961, May 15, v. 60, No. 10, [in Hebrew 337–9. (21 refs.) English summary 339].

The English summary appended to the paper is as follows:—

"Three fatal cases of heatstroke with afibrinogenemia and multiple hemorrhages are described. In one case strong fibrinolytic activity could be demonstrated. The possible role of fibrinolysis and afibrinogenemia in the clinical picture of heatstroke is shortly discussed."

HOAGLAND, R. J. & BISHOP, R. H., Jr. **A Physiologic Treatment of Heat Stroke.** *Amer. J. Med. Sci.* 1961, Apr., v. 241, No. 4, 415–22. [15 refs.]

After reviewing the treatment and mortality of heat stroke the authors conclude that the practice of placing patients in tubs of ice-cold water is unphysiological since it stimulates metabolism and impedes heat loss by promoting vasoconstriction. In a large series quoted one-third of the severely affected heat stroke patients died although their body temperature had been lowered rapidly.

The authors recommend the following more rational regimen which they have used successfully in one case.

Cooling was promoted by wet towels applied to the skin and by moving air from fans. Oxygen was administered by intermittent positive pressure. Intravenous transfusion of 5% dextrose in isotonic saline solution was given and promethazine hydrochloride (Phenergan 50 mgm.), dipyrone (Novaldin 1 gm.), chlorpromazine (200 mgm.) and hydrocortisone (200 mgm.) were administered by the drip technique.

Body temperature fell in 5 hours or so from 109°F. in the axilla to 96·6°F. in the rectum. The patient became rational in 2 hours and recovery was uneventful. Here the dipyrone acted as an antipyretic and the chlorpromazine promoted vasodilation and muscular relaxation.

The successful use of chlorpromazine in heat stroke was previously reported by YEN *et al.* [this *Bulletin*, 1959, v. 56, 484].

Heat stroke is now rare in the U.S. Army; this was the only case which occurred since the introduction of preventive measures in 1958 [see also *ibid.*, 1958, v. 55, 580, 581]. *M. L. Thomson*

STONEHILL, R. B. & KEIL, P. G. **Successful Preventive Medical Measures against Heat Illness at Lackland Air Force Base.** *Amer. J. Pub. Health.* 1961, Apr., v. 51, No. 4, 586–90, 1 fig.

At Lackland Air Force Base, Texas, during the summer of 1956 there were 13 cases of heat stroke with 2 deaths, and in 1957, following an influx of men not acclimatized to heat or fully conditioned to vigorous physical training, there were 39 cases. Other manifestations of heat illness were heat cramps and heat exhaustion, the latter being the most frequent type of heat illness. Heat stroke constituted an acute emergency.

During the summer of 1958 a more vigorous programme of preventive measures was instituted. The chief of these was that whereas previously the dry-bulb temperature had been used as the index of heat, the wet bulb-globe temperature of YAGLOU & MINARD [this *Bulletin*, 1958, v. 55, 580] was introduced as the indicator for modifying the training programme. This parameter was determined half-hourly through the day, and when the WBGT reached 88°F. red flags were displayed and outdoor training activities ceased until the index was again below 88°F. In consequence, during the summer of 1958 only 2 cases of heat stroke occurred, and later investigation of one of the patients showed that he had congenital ectodermal defects including the absence of sweat glands.

The outdoor physical training was scheduled from 0600 to 1000 hours. During the months of June to September training was halted 6 times when the WBGT exceeded 88°F. The total time lost from the scheduled period was 6 hours, and this was made up after 1800 hours when the temperature had declined.

Other items in the preventive medical programme included supplemental salt and water intakes, adequate clothing protection against direct solar heat, and the postponement of arduous activities until after the first week of training. *Thomas Bedford*

PARASITOLOGY: GENERAL

SILLANI, Miranda & BELLOSTA, C. L'incidenza delle parassitosi intestinali nei lavoratori delle fornaci della provincia di Novara. [**The Incidence of Intestinal Parasites in Brickworkers in the Province of Novara, Italy**] *Ann. d. San Pubblica.* Rome. 1961, Jan.–Feb., v. 22, No. 1, 59–68. [12 refs.] English summary.

In 1959, the authors examined 457 workers in 18 brick kilns in Novara for the presence of intestinal parasites: they used fresh and concentrated specimens of stools for this purpose.

The results are tabulated. The principal finding was that 47% of specimens contained parasites. The commonest was *Trichuris* (26·6%) followed by *Ascaris* (12·6%). *Entamoeba coli* was present in 15·5% and *Giardia* was found in 9 subjects. *E. histolytica* was not found, and hookworms were present in only one person.

The sanitary conditions of the workplaces were good but many of the workers came from areas outside the Province and the authors stress the danger of asymptomatic carriers who may come from infected areas.

H. J. O'D. Burke-Gaffney

BABBOTT, F. L., Jr., FRYE, W. W. & GORDON, J. E. **Intestinal Parasites of Man in Arctic Greenland.** *Amer. J. Trop. Med. & Hyg.* 1961, Mar., v. 10, No. 2, 185–90. [12 refs.]

This is an account of a survey for intestinal parasites in Egedesminde and 9 adjacent settlements at the south end of Disko Bay in Greenland. Communal sleeping rooms for entire families were common and the most usual method of disposal of excreta was by emptying the commode near the building whence they were scavenged by dogs. The survey covered about 15% of the population of Egedesminde and 42% of those living in the settlements. Single specimens from each subject were preserved in merthiolate [thiomersal] and examined at the School of Medicine, Louisiana State University, by the formalin-ether method of concentration.

The total parasite rate was 76% in the settlements, and 60% in the town of Egedesminde, with the peak incidence (92% and 73%) in the age-group 5–14 years.

No infections with either *Ascaris lumbricoides* or hookworm were detected, and *Enterobius vermicularis* was the only common nematode identified.

Two types of trematode eggs were seen and were provisionally identified as *Metorchis conjunctus* and *Cryptocotyle lingua*, the latter a parasite of birds and mammals not previously described in man.

No cases of infection with species of *Diphyllobothrium* were seen.

Entamoeba histolytica was found in 16% but correlation with clinical histories suggested that amoebiasis was not an important cause of diarrhoea. It is stated that the small race of *E. histolytica* was detected in only one stool specimen but no comment on this is made. [This is very remarkable when compared with the results of other surveys. The division between large and small races has almost always been found about equal with a tendency for the small race to be more frequent the colder the climate.]

W. P. Stamm

ZELEDÓN, R. **Comparative Physiological Studies on Four Species of Hemoflagellates in Culture. IV. Effect of Metabolic Inhibitors on the Respiration.** *Rev. Biologia Trop.* San José, Costa Rica. 1960, Dec., v. 8, No. 2, 181–95, 8 figs. on 2 pls. [30 refs.]

Attention has frequently been drawn to the correlation between metabolic inhibition of haemoflagellates by certain chemical reagents and their biological and morphological classification. Data are here given about the effect of fluoroacetate, cyanide, azide, iodoacetate and arsenite on the respiration of *Endotrypanum schaudinni, Leishmania enriettii, Schizotrypanum* [*Trypanosoma*] *cruzi* and *Schizotrypanum vespertilionis* [see this *Bulletin*, 1960, v. 57,

954; 1961, v. 58, 380, 381]. The organisms were harvested as described previously and suspended in phosphate saline at *p*H 7·2. Respiration was measured at 31°C. in presence of glucose with addition of inhibitor at concentrations of 10^{-3}, 10^{-4} and 10^{-5} and at half these concentrations in the case of cyanide. All organisms appeared to be sensitive to these agents but in varying degrees and endogenous respiration was similarly influenced. Motility of the parasites was affected to a different extent, a good correlation being observed between motility and degree of inhibition by thiol agents. Attention is drawn to the importance of -SH enzymes and those with a heavy metal catalyst as well as to the significance of the Krebs cycle. *J. D. Fulton*

Bayer, M. E. & Dennig, K. H. Elektronenoptische Untersuchungen an *Babesia canis*. [**Electron Microscopic Studies of** *Babesia canis*] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1961, v. 12, No. 1, 28–35, 3 figs. [14 refs.]

Mackerras, M. Josephine. **The Haematozoa of Australian Reptiles.** *Australian J. Zool.* 1961, Mar., v. 9, No. 1, 61–122, 162 figs. on 12 pls. [Numerous refs.]

This very detailed account includes records of trypanosomes from tortoises, a gecko, and skinks, *Trypanosoma phylluri* and *T. egerniae* being new. Two species of *Plasmodium* are known from lizards, *P. egerniae* being new. Several new haemogregarines are also described. *H. J. O'D. Burke-Gaffney*

Mackerras, M. Josephine & Mackerras, I. M. **The Haematozoa of Australian Frogs and Fish.** *Australian J. Zool.* 1961, Mar., v. 9, No. 1, 123–39, 33 figs. on 3 pls. [19 refs.]

"A trypanosome and a haemogregarine have been described from frogs. Two species of trypanosomes and 2 of haemogregarines are known from elasmobranchs; 2 trypanosomes, 1 trypanoplasm, and 4 haemogregarines from marine teleosteans; and 2 trypanosomes from freshwater teleosteans. *Haemogregarina hemiscyllii* from *Hemiscyllium ocellatum* (Elasmobranchii) and *Hg. tetraodontis* from *Tetraodon hispidus* (Teleostei) are new."

Oliver-González, J. & Kent, H. N. **Serological Relationships between Collagenase and the A_2-Isoagglutinogen-Like Substance of Animal Parasites.** *Proc. Soc. Exper. Biol. & Med.* 1961, Apr., v. 106, No. 4, 710–14, 2 figs. [10 refs.]

ENTOMOLOGY AND INSECTICIDES: GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene.]

JEEVANDHARAKUMAR, S. A. **Further Record of** *Anopheles annandalei* **var.** *interruptus* **Puri from Mysore State, India.** *Bull. Nat. Soc. India. for Malaria & other Mosquito-Borne Dis.* 1960, Sept.–Nov., v. 8, Nos. 5/6, 159–60.

WHANG, C. H. **Hibernation of Mosquitoes in Korea.** *Mosquito News.* 1961, Mar., v. 21, No. 1, 17–20.

Among 5,262 adult mosquitoes collected from hibernating sites during the winter (November 1959–April 1960), mostly near Seoul, 97% were *Culex pipiens*, and all were females except for 6 male *C. pipiens*. Other species collected were *Anopheles sinensis* 45, *A. sineroides* 13, and *C. orientalis* 20. All the *C. pipiens* were without blood and 175 dissected were nulliparous. Mosquitoes were found beneath bridges, in culverts, caves, air [raid] shelters and cow stables. The largest number were collected from culverts and caves where the temperature and humidity were higher than outside. No larvae could be found between 5 November and 10 April and the species discussed are believed to hibernate as adults. One of the coldest months was January with an average temperature of –3·3°C., but temperatures in the main hibernating sites were usually above freezing; thus on a day when the outside temperature was –10°C., inside a culvert 300 metres long where *C. pipiens* were resting the temperature was 2 to 3°C., but the mosquitos were motionless and could not be stimulated by being breathed on or by light as they could when it was less cold.

In caves some dead mosquitoes were seen still attached to the wet walls. When *C. pipiens* collected from a cave were exposed to outdoor temperatures of –6 to –9°C. for 5–10 minutes they became motionless and appeared dead, but revived soon after being returned to room temperatures of 10 to 20°C.; of 499 tested in this way 86 died in 24 hours and 55 in 48 hours after collection. When 33 *A. sinensis* and *sineroides* were similarly tested all died in 12 hours.

The average body weight, moisture and fat content of 251 *C. pipiens* tested in March just before the end of hibernation were all lower than for 1,100 specimens tested in February, thus:—

	Body wt. mgm.	Moisture %	Fat %
Feb.	4·76	69·35	6·43
Mar.	4·63	67·23	4·85

Attempts to find virus of Japanese B encephalitis in 3,383 *C. pipiens* ground up in pools of 50 and inoculated into suckling mice did not succeed. The usual vector of this virus is *C. tritaeniorhynchus*. *J. A. Reid*

KARDOS, E. H. & BELLAMY, R. E. **Distinguishing Nulliparous from Parous Female** *Culex tarsalis* **by Examination of the Ovarian Tracheation.** *Ann. Entom. Soc. of America.* 1961, May, v. 54, No. 3, 448–51, 4 figs.

DAS, M. & NEEDHAM, P. H. **Effect of Time and Temperature on Toxicity of Insecticides to Insects. I. Tests of DDT on Larvae of *Aëdes aegypti* L.** *Ann. Applied Biol.* 1961, Mar., v. 49, No. 1, 32–8, 1 fig. [25 refs.]

Various authors have investigated the effects of temperature on the action of contact insecticides. It seems that these effects may vary in different phases of the poisoning process, which can be broken down into pre-treatment, treatment and post-treatment periods. The result obtained at any given temperature, maintained throughout, will be the resultant of these interacting factors.

The authors have investigated some of these effects in relation to larvicide tests with DDT suspensions against *Aedes aegypti* larvae. Their results are consistent with those of several other authors. It seems that high temperature during the actual exposure period tends to increase insecticidal effect, apparently by increasing pick-up or absorption of insecticide. (Analogous results are observed when the insects are confined on treated surfaces and made to dose themselves by walking over insecticide deposits.) During the post-treatment phase, temperature has an anomalous effect with DDT poisoning in that high temperature abolishes signs of poisoning which, however, reappear when the temperature is lowered. This change can be repeated more than once; and it was possible to demonstrate it with weak suspensions of DDT, maintained throughout treatment and recovery. With strong concentrations of DDT, however, there was no apparent effect of temperature (between 15°C. and 28°C.). This lack of response at high doses has also been observed with other insects.

The reversible effect of low temperature on DDT intoxication is difficult to explain. It has been postulated that the lowered temperature decreases the action of detoxifying enzymes; but data from other sources make this unsatisfactory as a complete explanation. *J. R. Busvine*

ABEDI, Z. H. & BROWN, A. W. A. **DDT-Resistance Hazard in North American Populations of *Aedes aegypti*.** *Mosquito News.* 1961, Mar., v. 21, No. 1, 1–4, 1 fig. [19 refs.]

"By means of selection pressure in the laboratory, it has been shown that strains of *Aedes aegypti* from New Orleans, La. and Key West, Fla., are capable of developing high DDT-resistance in the larvae, the results paralleling those obtained from a strain from Cucuta, Colombia. It is therefore concluded that the DDT-resistance hazard in populations in the southern U.S.A. is just as high as in Central American regions."

FOX, I. & GARCIA-MOLL, Ileana. **Multi-Resistant *Aedes aegypti* in Puerto Rico and Virgin Islands.** *Science.* 1961, Mar. 3, v. 133, 646–7.

A previous paper by Fox [this *Bulletin*, 1960, v. 57, 1224] announced the discovery of DDT plus dieldrin resistance in *Aedes aegypti* in Puerto Rico. The evidence was based on tests after 10 generations in the laboratory. The resistant strain has been maintained for a further 40 generations and was

tested again (larval and adult tests). The results indicated that the resistance had persisted and, indeed, seemed even higher. Furthermore, there now seemed to be tolerance for organophosphorus insecticides. At the same time, tests were done with a new field strain, which gave very similar results; and the same wide resistance pattern was also shown by a field colony from another Caribbean island, St. Croix.

In an attempt to find a compound capable of controlling these refractory mosquitoes, larvicide tests were made with the synergist piperonyl butoxide ("PB") and one or two organophosphorus insecticides. The best results were obtained with Bayer 29493 (*i.e.*, O,O-dimethyl O-[4-(methylthio)-*m*-tolyl] phosphorothioate) plus PB in a 10:1 ratio. *J. R. Busvine*

WHITTEMORE, F. W., Jr., KEEGAN, H. L., HEDEEN, R. A. & FOWLER, H. W., Jr. **Relative Effectiveness of Diethyl Toluamide and M-2020 against** *Aedes scapularis* **(Rondani).** *Pub. Health Rep.* Wash. 1961, Feb., v. 76, No. 2, 179–82.

The effectiveness of diethyl toluamide [this *Bulletin*, 1955, v. 52, 840; 1957, v. 54, 1250] as a repellent against *Aedes scapularis* has been compared with that of a standard U.S. Army insect repellent, M-2020 (dimethyl phthalate, 40%; 1,3-hexanediol, 2-ethyl, 30%; dimethyl carbate, 30%). Diethyl toluamide appeared to be markedly superior to M-2020 at equal concentrations and was also more resistant to rubbing. In an addendum it is reported that the U.S. Army has substituted 75% diethyl toluamide for 100% M-2020 as its standard insect repellent. *B. R. Laurence*

SUPPERER, R. & KUTZER, E. Beitrag zur Kriebelmücken-Fauna (Diptera, Simuliidae) Österreichs. **[Observations on Simuliids of Austria]** *Ztschr. f. Parasitenk.* 1961, v. 20, No. 6, 538–40. [13 refs.]

CLASTRIER, J. & GRENIER, P. Nouvelles récoltes de *Simulium ruficorne* Macq. au Sahara. **[New Records of** *Simulium ruficorne* **in the Sahara]** *Arch. Inst. Pasteur d'Algérie.* 1961, Mar., v. 39, No. 1, 106–7.

NGUY, V. D. & BUSVINE, J. R. **Studies of the Genetics of Resistance to Parathion and Malathion in the Housefly.** *Bull. World Health Organization.* Geneva. 1960, v. 22, No. 5, 531–42, 7 figs.

Four strains of house-fly were used for the investigation of inheritance of resistance to the organophosphorus insecticides, each strain having been established as a pure homogeneous population by selection and inbreeding. These strains are (1) normal—susceptible to both malathion and parathion, (2) Danish—resistant to parathion only, (3) Italian—also resistant to parathion only, and (4) American—resistant to malathion only. A topical application of the insecticide in olive oil was used for measuring resistance [BUSVINE, this *Bulletin*, 1959, v. 56, 894] and a series of concentrations used to give probit/log concentration regression lines.

The results from crossing the normal and Italian and the normal and Danish strains show the discriminating dosage plateau for parathion at 0·05% to 0·1%, separating the normal and susceptible strain and the F_1. The F_2 and backcross generation segregate at this dosage according to the Mendelian pattern when a single dominant gene is involved.

Similarly, malathion resistance is shown to be inherited by a single dominant gene, the discriminating dosage being between 0·5% and 1·0% malathion.

Crossing the American and Italian strains shows that the genes for resistance to parathion and malathion are not allelic, though there is some evidence that the genes occur on the same chromosome. *C. Elizabeth Jackson*

HARRIS, R. L., WEARDEN, S. & ROAN, C. C. **Preliminary Study of the Genetics of House Fly (*Musca domestica*) Resistance to Malathion.** *J. Econom. Entom.* 1961, Feb., v. 54, No. 1, 40–45, 2 figs. [14 refs.]

This abstract is based mainly on the authors' own summary.

Two strains of house-flies (*Musca domestica*), one susceptible and one resistant to malathion, were selected by inbreeding from the progeny of individual females from a slightly resistant (1·7 times) field strain. The latter was collected at Juniata (near Manhattan, Kansas) ranch in 1958 and was kept in the laboratory for 8 generations when selection was begun. Selection for susceptibility required one generation and the strain obtained was as susceptible as an insecticide-susceptible laboratory strain (KUN). The resistant strain was obtained after the selection of 3 successive generations and it was 62 times as resistant as the susceptible strain.

The two selected strains differed in other biological characters. Statistical analysis of the data of the life cycle revealed that the life cycle of the resistant strain was longer than that of the susceptible strain. The males in the susceptible strain emerged significantly earlier than the females. The resistant strain was of lower fecundity than the parent and the susceptible strains. The sex ratio in the two strains did not differ from the 1:1 ratio.

For a genetic study of malathion resistance, reciprocal crosses were made between the two selected malathion-susceptible and malathion-resistant strains. The F_1 hybrids segregated into 50% susceptible and 50% resistant individuals. Since the resistant strain was uniform the results cannot be explained on the basis of simple Mendelian inheritance. The authors suggested that the most acceptable explanation for this segregation is that malathion resistance is inherited by two allelic groups of genes exhibiting incomplete duplicate dominance epistasis.

The F_2 generation did not differ significantly from the F_1 and segregated into the 1:1 susceptible: resistant ratio on the basis of epistasis. Since the expected ratios for independent segregation and perfect linkage are so similar, it could not be determined whether the two proposed sets of alleles were linked. However, the authors concluded that if the two allelic groups were closely linked, the mode of inheritance of malathion resistance could be through one dominant gene [NGUY and BUSVINE, above, p. 1085], or 2 sets of alleles of incomplete duplicate epistasis, or a recessive gene, depending on the frequency of genotypes in the resistant strain.

Maternal effects were present in the F_1 hybrids but had disappeared in the

F_2 generation. The F_2 generation of the reciprocal crosses were the same, which suggested that no sex-linkage is involved in inheritance of malathion resistance in house-flies. *A. M. Guneidy*

NAGATY, H. F., RIFAAT, M. A. & MORSY, T. A. **Investigation of the Larvicidal Action of some Organic and Inorganic Compounds against Two Myiasis Producing Dipterous Larvae** (*Musca domestica* **var.** *vicina* **and** *Chrysomyia albiceps*). *J. Egyptian Pub. Health Ass.* 1960, v. 35, No. 3, 145–52. [13 refs.]

In view of the wide incidence of resistance shown by flies to the new synthetic insecticides, it seems desirable to continue seeking for alternatives. The authors have conducted some simple laboratory tests with larvae of house-flies and blowflies (*Chrysomyia albiceps*) to investigate the possible larvicidal value of miscellaneous substances. Larvae collected from the field were placed in Petri dishes containing filter papers soaked in solutions of various substances. In other tests, the compounds were added to minced meat in which the larvae were feeding. The fly larvae were more susceptible than those of *Chrysomyia*. The most effective compounds (in descending order) were, in general: methyl benzoate, nicotine sulphate, boric acid, copper sulphate, piperazine hydrate, carbamazine piperazine citrate.

J. R. Busvine

CALVERT, H. **Myiasis from the Tumbu Fly: Two Cases recorded in Britain.** [Memoranda.] *Brit. Med. J.* 1961, May 27, 1513–14, 2 figs.

The 2 children affected had arrived the day before from Ghana, where they had been living.

CLASTRIER, J., RIOUX, J. A. & DESCOUS, S. Notes sur les Cératopogonidés. XII. Cératopogonidés du Nord-Tchad. [**Notes on Ceratopogonids. XII. Ceratopogonids of North Chad**] *Arch. Inst. Pasteur d'Algérie.* 1961, Mar., v. 39, No. 1, 49–98, 32 figs. [31 refs.]

WEIDHAAS, D. E., BOWMAN, M. C. & SCHMIDT, C. H. **Loss of Parathion and DDT to Soil from Aqueous Dispersions and Vermiculite Granules.** *J. Econom. Entom.* 1961, Feb., v. 54, No. 1, 175–7. [14 refs.]

Laboratory and field tests have shown that granular formulations of insecticides can be used successfully against mosquito larvae. However, comparatively little is known about their release from the granules and effects of mud, etc., on the concentrations available to poison the larvae. The work described used radioactively labelled parathion (^{32}P) and DDT (^{14}C) to investigate some of these points.

It was found that both insecticides were strongly adsorbed by soil from

water dispersions. The loss of DDT in the mud was apparently independent of the volume of water, but the loss of parathion was about doubled with a smaller volume (100 and 250 cc.). Bioassay tests of parathion extracted from the mud and from the water after 24 hours indicated no loss of toxicity due to possible chemical degradation.

Experiments with DDT in marsh water from different places, showing large variation in total chloride, *p*H and total solids, showed that these factors had little influence on the distribution of 0·02 p.p.m. DDT or its codistillation from the water [see WEIDHAAS *et al.*, this *Bulletin*, 1960, v. 57, 1224].

Some of the tests involved vermiculite granules carrying either parathion or DDT. The tests showed that parathion was almost completely shed into the water, providing there was enough water; if not, saturation of the solution appeared to slow the release. The DDT-treated granules threw off part of the DDT at once, probably as fine particles, but no more, which might be expected as DDT is so insoluble in water.

Among the factors affecting release of toxicants from treated granules were: (1) their solubility in water; (2) their concentration in the granules; (3) rate of application of the granules to water; (4) depth of the water (when soil was present); (5) type of carrier; (6) agitation of the water. *J. R. Busvine*

WORLD HEALTH ORGANIZATION. **Specifications for Pesticides. Insecticides—Rodenticides—Molluscicides—Herbicides—Auxiliary Chemicals—Spraying and Dusting Apparatus.** 2nd Edition. 523 pp., 31 figs. 1961. Geneva: Palais des Nations. [Sales agent for U.K., H.M. Stationery Office.] [50s.; $10.00; Sw.fr. 30.–.]

This publication originally appeared in 1953 as a loose-leaf booklet, the intention being to add new specifications from time to time [see this *Bulletin*, 1954, v. 51, 120]. By 1956, many more products and specifications were coming into use and there was need for a revised version which took the form of a book (*Specifications for Pesticides*, WHO, Geneva, 1956). In addition to the original notes on DDT and BHC this included data for technical allethrin, diazinon, malathion and parathion; wettable powders for chlordane, dieldrin, diazinon, malathion; emulsion concentrates of several additional chemicals. There was also a short section on dusting powders and one on auxiliary chemicals (synergists, etc.). A new section on rodenticides included specifications for ANTU, arsenious oxide, coumachlor, red squill, "1080", warfarin and zinc phosphide. Another new section on molluscicides covered copper sulphate, pentachlorphenol and its salt. The sections on spraying and dusting machinery were broadly similar.

Now a new edition has appeared with additional information. There is a new section on herbicides and one on oils, with and without insecticides; also notes on granulated mosquito larvicides. Additional chemicals and formulations are given for Chlorthion and trichlorphon (Dipterex) and certain new formulations of earlier mentioned insecticides. *J. R. Busvine*

MISCELLANEOUS PAPERS

KAHN, E. **Pediatrics in an Industrialized Part of Africa.** *J. Pediatrics.* St. Louis. 1961, Feb., v. 58, No. 2, 277–85, 5 figs. [34 refs.]

The author writes from the large Baragwanath Hospital, Johannesburg, which caters for the enormous local African industrial community.

The major paediatric problems are the infections (particularly gastro-intestinal) and protein malnutrition. The acute diarrhoeal diseases of children are seasonal, half of the severe cases are related to shigella and salmonella infections, and most of these patients show in addition evidence of protein malnutrition due to weaning on diets of maize. Weaning tends to be early because in this way the mother can return to work—it is an economic necessity.

"There is little evidence that kwashiorkor causes permanent damage." It does not lead to cirrhosis of the liver, whose causes in Johannesburg are much the same as in North America. The case mortality of children admitted with severe protein malnutrition is 20%.

The author mentions various other common conditions. He explains the organization whereby African mothers with premature babies are admitted to hospital along with the babies, and nurse them, thus learning how to handle them, and at the same time effecting an economy in professional nursing staff.

He ends by mentioning the importance of education and preventive medicine in the growing industrial areas of Africa [and it seems to the reviewer that the answers to the problems he mentions are political, social and administrative rather than medical]. *Charles Wilcocks*

REPORTS AND SURVEYS

SOUTH AFRICAN J. LAB. & CLIN. MED. 1960, Dec., v. 6, No. 4, 187–216, 10 figs. [35 refs.] **The Health and Nutritional Status of the Kung Bushmen of South West Africa.**

A survey of Bushmen in South-West Africa was carried out by a group that was led by B. Bronte-Stewart and is reported in a series of six papers:

(i) *Purpose, Itinerary and Methods* by B. BRONTE-STEWART, O. E. BUDTZ-OLSEN, Joan M. HICKLEY and J. F. BROCK (pp. 188–191).

(ii) *Social, Cultural and Dietary Background* by B. BRONTE-STEWART and J. F. BROCK (pp. 191–193).

(iii) *Clinical Observations* by J. F. BROCK and B. BRONTE-STEWART (pp. 194–202).

(iv) *Biochemical Aspects* by B. BRONTE-STEWART and O. E. BUDTZ-OLSEN (pp. 202–210).

(v) *Prevalence of Eye Diseases* by Joan M. HICKLEY (pp. 210–214).

(vi) *Conclusions* by J. F. Brock, B. Bronte-Stewart, O. E. Budtz-Olsen and Joan M. Hickley (pp. 214–216).

The survey was undertaken, firstly, to assist a government investigation into the state of health of the Bushmen and, secondly, to gain information on comparative racial aspects of health and clinical nutrition. The main line of investigation was by means of questioning through interpreters, on the general state of health of the people, their feeding habits, food supplies, and their attitude to disease. This verbal information was supplemented, when possible, by clinical and laboratory examinations; by anthropological typing by either somatotyping, prevalence of blood sickling or blood grouping; and by botanical identification of the common foodstuffs. About 1,350 Kung Bushmen from four settlements at varying distances from the Okawango river were examined. Most of them travelled some distance to the place of examination. It is unlikely, therefore, that the sample included the very weak in their communities.

The Kung Bushmen hunt wild game, which is now becoming scarce, and supplement this with wild nuts, beans, edible roots and insects. Their dietary habits are erratic, vacillating between periods of semi-starvation and overeating in relation to the availability of food. No clinical signs of dietary deficiency were observed. The Bushmen are short and of slight build with pronounced pot bellies which the authors ascribe to the lordosis that is a racial characteristic. However, 11·2% of those examined had a palpable liver, and splenomegaly was recorded in 51·8%; the highest incidence of splenomegaly was in people living near the river where malaria and schistosomiasis were most prevalent. Biochemical tests revealed a frequent slight proteinuria which was affected by posture. Serum proteins were high to normal, about 8–8·4% with relatively low A/G ratios. Examination of the eye showed a fair incidence of corneal and conjunctival changes, but most of these were ascribed to poor hygiene and excessive proximity to smoky fires rather than to poor nutrition. Protein deficiency in small children was largely avoided by the use of pulp from nuts and beans which was given to supplement breast milk when the child could sit up. Only the elderly appeared undernourished, or prematurely aged.

The authors concluded that nutrition was to some extent adversely affected by poor hunting opportunities, but this was not serious because of the excellence of the protein when it was available. *Ruth Schwartz*

Shambaugh, G. E., III. **Medical and Sanitary Data on Taiwan.** *J. Formosan Med. Ass.* 1960, Sept. 28, v. 59, No. 9, 775–826, 1 map. [139 refs.]

The author of this review is an officer of the Medical Corps, United States Army Reserve. Special attention is directed to medical and sanitary problems of military importance.

Taiwan is an island 235 miles long and 90 miles wide, with a population of about 10½ million, 85% of whom are located on the western plain. The Ministry of Health was incorporated with the Ministry of the Interior in 1947. The public health service is well organized, but lacks an adequate number of personnel.

Insects of medical importance include:—

(a) Mosquitoes

(1) Anopheline

Anopheles minimus, the chief malarial vector.

A. hyrcanus sinensis, *A. tessellatus*, *A. maculatus* and *A. fluviatilis*, potential malaria vectors.

(2) Aedes

Aedes aegypti and *A. albopictus*, dengue fever vectors.

(3) Culicine

Culex tritaeniorhynchus and *C. fusocephalus*, vectors of encephalitis.

C. fatigans, filariasis vector.

(b) Flies

Phaenicia cuprina and *Sarcophaga carinaria* are the commonest carriers of the cysts of *Entamoeba histolytica* and *Balantidium coli* and the eggs of *Taenia solium, Enterobius vermicularis, Trichuris trichiura, Necator americanus* and *Diphyllobothrium latum. Musca domestica* and *Chrysomyia megacephala* are the commonest carriers of bacillary dysentery, typhoid and paratyphoid fever.

(c) Lice

The head-louse and crab-louse are common, but the body-louse is uncommon in Taiwan.

(d) Fleas

Xenopsylla cheopis, which infests both rats and man, can carry the plague bacillus, *Pasteurella pestis*.

(e) Mites

Trombicula akamushi, vector of scrub typhus, *Liponyssus bacoti*, vector of endemic typhus, *Sarcoptes scabei*, the itch mite and the cause of scabies.

(f) Ticks

The ixodid and argasid ticks have been recorded, but their relationship to disease in Taiwan is at present unknown.

(g) Scorpions and centipedes

Species of these insects on Taiwan can cause a painful wound.

(h) Urticating caterpillars are present on the island.

Rodents are abundant on Taiwan and provide a reservoir for plague, scrub typhus, Weil's disease and endemic typhus. There are also 6 common species of poisonous snakes.

Major diseases of military importance are:—

(a) enteric diseases, especially dysentery, typhoid, protozoan infection, hepatitis and poliomyelitis;

(b) venereal diseases, especially syphilis, gonorrhoea and chancroid;

(c) skin diseases, especially the superficial fungus infections;

(d) malaria, which has one peak from August to December and another from May to June. In 1951 the annual malaria incidence was estimated at over 1,200,000 cases in a population of 7·8 million and 11,000 deaths from malaria were reported. In 1956 and 1957 only 488 and 434 cases of malaria

were recorded and no deaths from malaria were reported in either year. This striking reduction in malaria incidence has been effected by an organized control programme involving the application of residual insecticides to houses.

Diseases of potential military importance are Japanese B encephalitis, endemic and scrub typhus, heat injuries, epidemic keratoconjunctivitis, and respiratory diseases, such as pneumonia, influenza, measles, mumps and chickenpox. Diseases of potential military importance that could be imported into Taiwan are plague, epidemic typhus, dengue fever and cholera.

Diseases likely to affect small numbers of troops are tuberculosis, filariasis, fluke and intestinal helminth infections.

Miscellaneous diseases affecting the local population of Taiwan include trachoma, non-trachomatous viral conjunctivitis, leprosy, tetanus, goitre, spontaneous gangrene, leptospirosis, rat-bite fever, schistosomiasis and yaws.

Details are given of the organization of the Public Health Department and the scope of its many activities, which include the control of malaria, tuberculosis, venereal diseases, trachoma, diphtheria, rabies, filariasis, endemic goitre and hookworm.

The malaria programme has had the greatest success, the trachoma programme is progressing well, but it is too early as yet to determine the effectiveness of the tuberculosis programme. Venereal disease, gastrointestinal diseases and pneumonia continue to be public health problems of importance in Taiwan.

It is impossible in an abstract to give more than a general indication of the wealth of detail contained in this very comprehensive document.

G. Covell

BOOK REVIEWS

SYMES, Gwyn. **Health Science for Malayan Schools.** Book 1. 128 pp., frontispiece & 84 figs. 1960. London: University of London Press Ltd., Warwick Square, E.C.4. [6s.]

It is widely accepted that though health education should be directed to people of all ages, the best long-term results follow its introduction into the school curriculum. There is, therefore, a great need for attractive, informative books for use in schools by classes of different standards. The volume reviewed here has been prepared for pupils in Malayan Secondary Schools preparing for the Overseas Senior Cambridge Certificate Examination in Health Science. In her preface the author lays important emphasis on the need for supplementing classroom instruction by training in health habits and by a healthy and sanitary environment in the school. She recommends that the students should read by themselves and that the work in class should be practical.

The book is divided into two parts, the first occupying some 30 pages and entitled "Health in our daily lives". This covers the general background to health. The first chapter describes how the body works and sets out the arguments in favour of conscientiously raising health standards. In the second chapter community health is discussed, and the specific causes of death and disease are described, together with the underlying factors of ignorance, poverty and superstition. The third and last chapter of Part I describes how to look after personal health, and it explains the function of the instruments commonly used by the medical practitioners.

The title of Part II is "Health and personal appearance" and in 11 chapters covering some 90 pages, it describes in some detail the structure and working of the body, paying particular attention to the skin, teeth and posture. The final chapter deals with building a healthy body, with reference to nutrition, exercise, rest and relaxation, disease and accidents. Both parts contain appendices giving series of subjects suitable for discussion, for group or individual study and for examination questions. Among these is a set of recommended daily exercises.

The reviewer would have appreciated more attention paid to community health and how the pupils could help to improve it. It is a pity that the text does not appear to have been read in manuscript by a doctor; there are a number of minor errors which could have been corrected. The book is written in an interesting manner and well illustrated by very clear line drawings and photographs. It is essentially a book for girls and would probably not appeal to boys owing to its emphasis on personal appearance. The constant references to Malaya would limit its usefulness in other countries. Within these limitations the book achieves its purpose admirably.

T. H. Davey

LABORATORIO BEHRENS. **Medicina neotropical. Introduccion** 239 pp. **Esquistosomiasis mansonica** 232 + vi pp. **Tripanosomiasis americana** 203 + v pp. **Filariasis** 226 + ii pp. [Neotropical Medicine. Introduction. *Schistosoma mansoni* Infection. American Trypanosomiasis. Filariasis] Numerous illustrations. 1960. Caracas: Apartado 62, Venezuela.

These volumes initiate a series of monographs to appear approximately every 2 months, each dealing with a special aspect of medicine relevant to the Neotropical region, that is, South America and the regions north of it as far as 26°, which includes tropical areas in North America and the Antilles.

The work is published by the Laboratorio Behrens, a pharmaceutical organization in Caracas, Venezuela. No individual contributors are listed (except in connexion with illustrations), but the introductory leaflet and the individual monographs are signed on behalf of the medical department by the Medical Director, Dr. J. A. DE ARGUMOSA, who is evidently general editor of these publications. The series is not for sale.

The introductory volume covers a wide range of information, including such subjects as tropical medicine in general, the geographical regions, climate, flora and fauna, anthropology and short sections on such matters as publications, terminology, research institutions and medical societies. It includes a digest

of the international rules of zoological nomenclature. The arrangement of all these topics shows a varying emphasis: for example, the subject of general hygiene in the tropics occupies less than a page, while phytogeography covers 35 pages. This volume ends with an outline of the subjects treated and 2 pages of general bibliography. Readers who are not familiar with the Neotropical region will find in this volume a wide assortment of general information, which will serve as a useful background to the volumes which follow it.

The first 3 monographs deal respectively with *Schistosoma mansoni* infection, American trypanosomiasis and filariasis. All follow a similar plan, namely description of aetiology, vectors, hosts, clinical, pathological and epidemiological features, prevention and treatment. They contain an immense amount of information most usefully gathered under the covers of individual volumes. There are very many illustrations, many of them excellent and several in colour, and each volume ends with a lengthy bibliography. The printing and production is of a high quality. It is evident that a tremendous amount of work has gone into the preparation of these publications. While the emphasis on a particular aspect of each topic varies, there is a very great deal of information, with considerable references to the literature, mostly up to 1957.

Because of the limited circulation and the regional emphasis, the range of usefulness of these monographs for the general reader will naturally be somewhat restricted: but for those working in the vast area concerned, and for others interested in it, they should serve as a considerable source of reference.

H. J. O'D. Burke-Gaffney

SWELLENGREBEL, N. H. [Ph.D., M.D.] & STERMAN, M. M. [M.D.] **Animal Parasites in Man.** pp. x+652, numerous figs. 1961. Princeton. New York. Toronto. London. D. Van Nostrand Co. Ltd., 358 Kensington High Street, W.14. [67s. 6d.]

This is both a new book and a new edition of a very old one, *De Dierlijke Parasieten van den Mensch en van onze Huisdieren*, the latter having appeared in a number of revisions during the course of this century. But in its present form it has changed its character and lays greater emphasis on the epidemiological and therapeutic side of parasitology, still however maintaining the unique outlook of the senior author, which makes this volume a most desirable addition to any parasitologist's library.

The book follows the classical form of a general introduction, brief but highly original, and sections on Protozoa, Trematodes, Cestodes, Nematodes, Arthropods and Techniques.

Each infection is described first under morphology, then life cycle and method of transmission and finally under chemotherapy, but clinical features and control are largely omitted. The reaction of the host is often described in terms of topical restraint; thus *Entamoeba histolytica* is said to become pathogenic by the violation of topical restraint, *Hepatocystis kochi* maintains topical restraint, because there is no multiplication of the parasite in the blood. There is scarcely a subject which does not exhibit some such original slant, and the reader is constantly on the alert for twists and novelties.

Parasites are considered whenever possible according to the organ or tissue which they attack; thus the sporozoa are described under the intestinal varieties,

like *Isospora*, and the visceral, like *Plasmodium*. The distinction is often fundamental, because in one kind there may be no invertebrate host, in the other the intervention of a biting insect or some other invertebrate is necessary for the transference of the parasite from man to man. Similarly, the flagellates are divided into intestinal varieties and haemoflagellates. The helminths are treated differently, though the nematodes are conveniently separated into 5 groups where there is transmission, (1) by eggs (*Ascaris*, etc.), (2) directly by larvae (hookworms, etc.), (3) *via* alternate hosts (*Trichinella*), (4) *via* blood-sucking insects (filariae) and (5) *via* non-biting invertebrates (*Dracunculus*, etc.).

It is difficult to appreciate the logic of including a wide section on arthropods in this book, interesting and useful though it may be. The title indicates that the myiases, or other skin-invading arthropods should certainly be mentioned (as they are), but there seems little justification for describing fleas, bugs, lice, ticks, mites and mosquitoes, and some (*Pasteurella pestis* and rickettsiae) but not others (spirochaetes and many viruses) of the *non-animal* parasites which they transmit. It would perhaps be better to describe the arthropods, as vectors, under the appropriate protozoon or helminth. There is a short section on insecticides and repellents, with a summary of the resistance problem.

The practical side of parasitology is not neglected, for the last section is devoted to (1) laboratory equipment, (2) methods of examination of parasites in the excreta, etc. and blood, etc., (3) the simple culture methods, (4) stains and fixatives and (5) serological techniques. Fluorescent microscopy, cytochemistry, biochemistry and electron microscopy are omitted, and one still waits for a textbook on parasitology where these important modern additions to the subject are given full consideration.

A zoological attitude persists in this book, and although its title is *Parasites in Man*, the significance of the rarity is not overlooked, and *Babesia* is fully described on the basis of a single human instance, *Iodamoeba bütschlii* on the unique pathogenic and fatal case in a Japanese soldier, and a number of rare helminthic zoonoses, which illustrate important aspects of the subject.

There is a good index and a selection of references at the end of each chapter which shows the reader how to pursue his studies in greater detail. The book is very well illustrated by numerous line drawings and photographs and by 5 coloured plates of the blood forms of the malaria parasites.

P. C. C. Garnham

JOPLING, W. H. **Good Health in the Tropics. Advice to Travellers and Settlers.** 31 pp. 1961. Bristol 4: John Wright & Sons Ltd., The Stonebridge Press, Bath Road. [3s. 6d.]

This booklet gives the necessary advice to those about to travel to the tropics in the simplest and most concise form possible. Information on the vaccinations needed is reinforced by a list of the designated vaccination centres in the United Kingdom. The avoidance of malaria, schistosomiasis, intestinal infections and a few other common tropical conditions is explained briefly and without pathological detail. The first-aid treatment of snakebite and some hints on the health of domestic pets in relation to that of their masters are given.

Other well known booklets on health in warm climates, for example those issued by the Ross Institute and the Crown Agents, deal with the subject at

much greater length. It is difficult for a medical reviewer to adjudicate between the extra detail in these and the extreme brevity of Dr. Jopling. But he gives laymen the basic advice they need, and many—perhaps most—of them all they want to read on the subject. They can take their choice: Dr. Jopling's booklet will not let them down, and its popularity relative to that of the longer ones will be a subject for useful research. *B. B. Waddy*

NOTICE

HEALTH AND TUBERCULOSIS CONFERENCE IBADAN, NIGERIA—MARCH 1962

The Chest and Heart Association, with the co-operation of the Federal Government of Nigeria, is sponsoring a Health and Tuberculosis Conference to be held at the UNIVERSITY COLLEGE, IBADAN, NIGERIA from 26th–31st March, 1962.

The programme will include lectures and panel discussions on: Tuberculosis the greatest tropical menace, Tuberculosis and Leprosy, Community infection—cause and remedy, Drugs—their value and limitations, the techniques of community surveys, Non-pulmonary tuberculosis, Travelling clinics and village hygiene.

Applications for further details should be made to the Conference Secretary, The Chest and Heart Association, Tavistock House North, Tavistock Square, London, W.C.1.

It is with sincere regret that we record the death, on 26th July, 1961, of Professor Rupert Montgomery GORDON, O.B.E., M.D., Sc.D., F.R.C.P., D.P.H., who had been an eminent and valued contributor to this *Bulletin* from 1944 to 1961.

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